

THE FAR EASTERN REVIEW

ENGINEERING FINANCE COMMERCE

The Problem of
Extraterritoriality

By George E. Sokolsky

THE SHANGHAI-NANKING
RAILWAY

CHINA'S NEW AVIATION
CONTRACTS

DR. WADDELL'S MEMOIRS

10 BALDWIN LOCOMOTIVES
FOR CHINA'S RAILWAYS

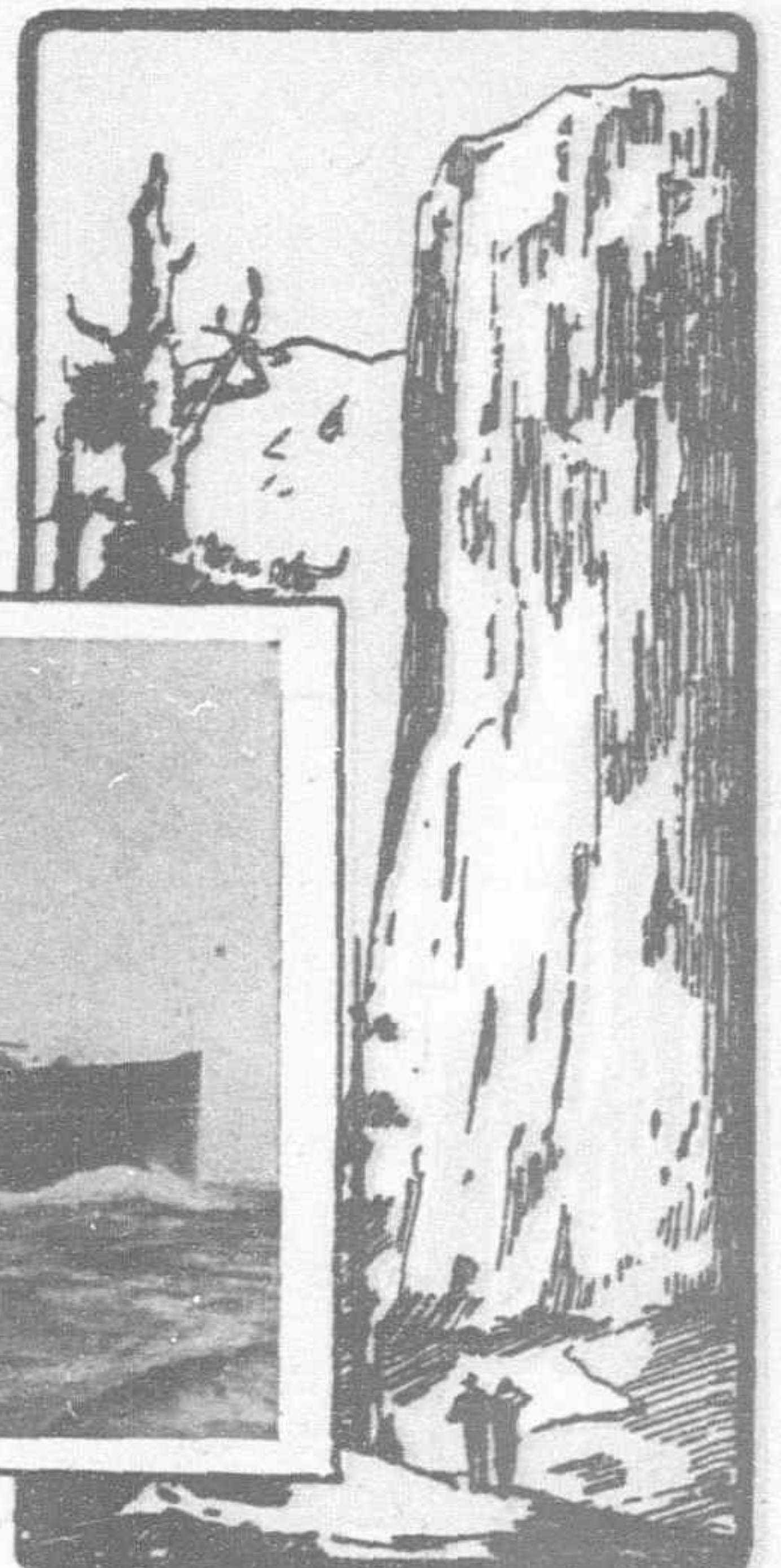
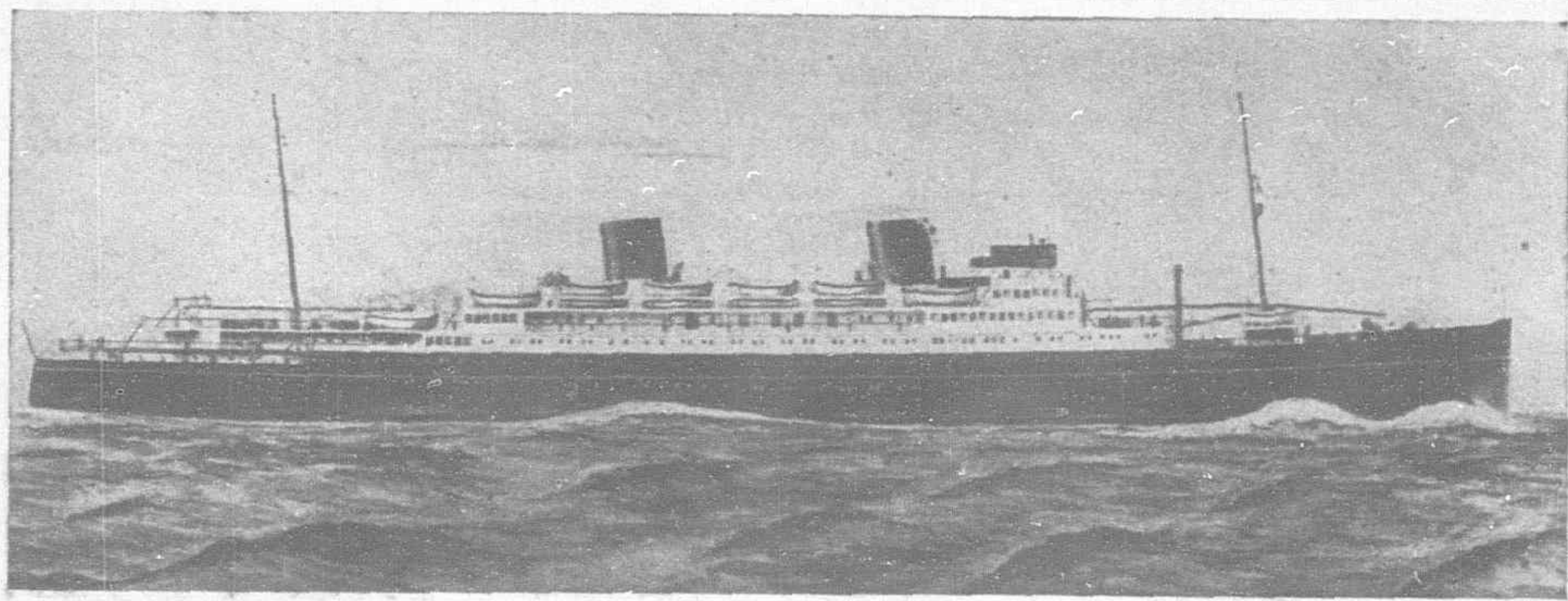
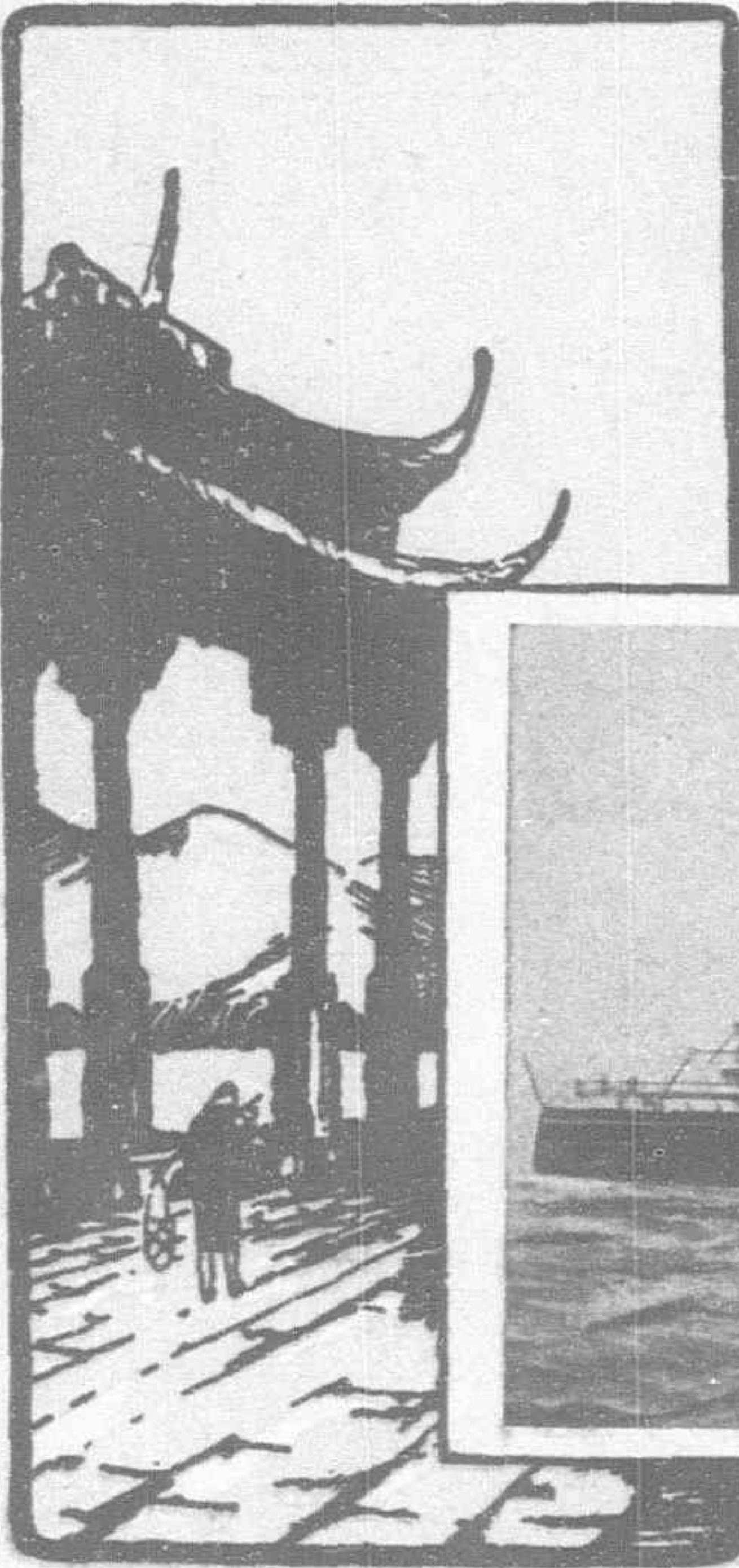
上海仁記路拾六號

遠東時報

Vol. XXV May, 1929 No. 5

SHANGHAI, PEKING, TOKYO AND MANILA

New Era Dawning in Trans-Pacific Travel



One of the Transcendent Trans-Pacific Trio ordered by the N. Y. K. Line to be commissioned in their Orient-California Fortnightly Service in 1929.

Details of the Transcendent Trio:

Quadruple Screw Motor-driven Passenger Liners.

Tonnage	...	...	...	...	...	16,500 gross tons, 22,000 displacement tons
Length	...	...	...	...	...	560 feet
Speed	...	...	...	...	...	19 knots

These vessels will embody the highest ideal of a passenger carrier and are expected to revolutionize the passenger traffic on the Pacific.

Principal Passenger Services in operation:—

To North America

Orient—California, Fortnightly Service.
Orient—Seattle Service, Fortnightly Sailings.

To South America

Orient—South American West Coast Service, approx. Monthly Sailing.
Orient—South American East Coast Service, approx. Monthly Sailing.

To Europe

Japan—Europe Fortnightly Service.

To Australia

Japan—Australia Monthly Service.

To Bombay

Japan—Bombay Monthly Service,

To Japan

China—Japan Rapid Express Service, sailings every four days.
Tsingtao—Japan Semi-monthly Service, etc., etc.

For information, please apply to

Shanghai
31 The Bund

Tsingtao
20 Kuan Tau Road

Tientsin
K. Y. K. Line,
French Concession

Hongkong
King's Building,
8, Connaught Road

N. Y. K. LINE

Head Office: Yusen Building, Tokyo

The Far Eastern Review

ENGINEERING

FINANCE

COMMERCE

VOL. XXV

SHANGHAI, MAY, 1929

No. 5

The Problem of Extraterritoriality

By George E. Sokolsky

IT is difficult to discuss the subject of extraterritoriality in China without prejudice and bias. The Chinese, who waxes enthusiastic over the immediate achievement of China's national aspirations, cannot view extraterritoriality with objective calmness, for the system is, to him, an offense, no matter by what historical processes it came into existence. Similarly, the foreign merchant, who is trading in China and whose investments have been made on the assumption of the continuance of his "treaty rights," cannot be calm and patient when it is suggested that extraterritoriality be abolished, for he is convinced that at the present time, it would be dangerous, if not impossible, for foreigners to do business in China without the protection of the extraterritorial system. The Chinese point to the fact that Germans and Austrians are without extraterritorial rights; the foreigner gathers documentary evidence to show how these nationals suffer from a lack of adequate protection of the individual and his business under the law.

The extraterritorial system came into being as a result of a conflict between the Chinese officials and the foreigners in Canton over the question of procedure. That conflict continues to this day. It is not a matter of codes or of the establishment of courts, but rather of the administration of the law equably and the definiteness and impartiality of procedure under the law. The Chinese contend that they are writing codes, which will have been completed by the end of this year and that the necessary courts will, by then, be established. The foreigners point emphatically to the need for experience and capacity in the administration of the codes and the courts.

There is no longer a "die-hard" attitude among the foreigners in China. No one desires that a system which is offensive to the articulate elements among the Chinese should continue permanently, but there is a desire that whatever changes are effected in this system, the process should be slow and protective so that it should not be accompanied by an automatic reduction in the value of property or any danger to the safeguarding of the rights of the individual.

At the Washington Conference, the delegates of the Powers assembled, passed the following resolution with regard to the abolition of extraterritoriality:

"The representatives of the Powers hereinafter named, participating in the discussion of Pacific and Far Eastern questions in the Conference on the Limitation of Armament, to wit, the United States of America, Belgium, the British Empire, France, Italy, Japan, the Netherlands and Portugal:

"Having taken note of the fact that in the Treaty between Great Britain and China dated September 5, 1902, in the Treaty between the United States of America and China dated October 8, 1903, and in the Treaty between Japan and China dated October 8, 1903, these several Powers have agreed to give every assistance towards the attainment by the Chinese Government of its expressed desire to reform its judicial system and to bring it into accord with that of western nations, and have declared that they are also "prepared to relinquish extraterritorial rights when satisfied that the state of the Chinese laws, the arrangements for their administration, and other considerations warrant" them in so doing:

"Being sympathetically disposed towards furthering in this regard the aspiration to which the Chinese Delegation gave expression of November 16, 1921, to the effect that "immediately or as soon as circumstances will permit, existing limitations upon China's political, jurisdictional and administrative freedom of action are to be removed;"

"Considering that any determination in regard to such action as might be appropriate to this end must depend upon the ascertainment and appreciation of the complicated states of fact in regard to the laws and the judicial system and the methods of judicial administration of China, which this Conference is not in a position to determine;

"Have resolved

"That the Governments of the Powers above named shall establish a Commission (to which each of such Governments shall appoint one member) to inquire into the present practice of extraterritorial jurisdiction in China, and into the laws and the judicial system and the method of judicial administration of China, with a view to reporting to the Governments of the several Powers above named their findings of fact in regard to these matters, and their recommendations as to such means as they may find suitable to improve the existing conditions of the administration of justice in China, and to assist and further the efforts of the Chinese Government to effect such legislation and judicial reforms as would warrant the several Powers in relinquishing, either progressively or otherwise, their respective rights of extraterritoriality;

"That the Commission herein contemplated shall be constituted within three months after the adjournment of the Conference in accordance with detailed arrangements to be hereafter agreed upon by the Governments of the Powers above named, and shall be instructed to submit its report and recommendations within one year after the first meeting of the Commission;

"That each of the Powers above named shall be deemed free to accept or reject all or any portion of the recommendations of the Commission herein contemplated, but that in no case shall any of the said Powers make its acceptance of all or any portion of such recommendations either directly or indirectly dependent on the granting by China of any special concession, favor, benefit, or immunity, whether political or economic."

And the further Resolution:

"That China, having taken note of the Resolutions affecting the establishment of a Commission to investigate and report upon extraterritoriality and the administration of justice in China, expresses its satisfaction with the sympathetic disposition of the Powers hereinbefore named in regard to the aspiration of the Chinese Government to secure the abolition of extraterritoriality in China, and declares its intention to appoint a representative who shall have the right to sit as a member of the said Commission, it being understood that China shall be deemed free to accept or reject any or all of the recommendations of the Commission. Furthermore, China is prepared to co-operate in the work of this Commission and to afford to it every possible facility for the successful accomplishment of its tasks.

The Commission met in Peking under the Presidency of Mr. Silas Strawn from January to September, 1926, holding altogether 21 sessions, including a travelling committee, which was sent about the country, but "the original program of travel contemplated by the Commission had to be considerably curtailed as the Chinese authorities at Canton formally declined to receive the travelling committee on the ground that extraterritoriality should be immediately abolished without investigation, and certain other parts of China such as Taiyuanfu, Kalgan, Kweihua, Paotao and Ninghsia were inaccessible on account of disturbed political conditions and the difficulty of making transport arrangements."

The commission published a voluminous report but what concerns us most emphatically are the recommendations which constitute Part IV of the report and which are here given in full:

PART IV.—THE COMMITTEE REPORT—The Commissioners, having completed their investigations and having made their findings of fact as set forth in Parts I, II, and III of this report, now make the following recommendations.

The Commissioners are of the opinion that, when these recommendations shall have been reasonably complied with, the several Powers would be warranted in relinquishing their respective rights of extraterritoriality.

It is understood that, upon the relinquishment of extraterritoriality, the nationals of the Powers concerned will enjoy freedom of residence and trade and civil rights in all parts of China in accordance with the general practice in intercourse among nations and upon a fair and equitable basis.

I.—RECOMMENDATIONS. The administration of justice with respect to the civilian population in China must be entrusted to a judiciary which shall be effectively protected against any unwarranted interference by the executive or other branches of the Government, whether civil or military.

II.—The Chinese Government should adopt the following program for the improvement of the existing legal, judicial and prison systems of China:

1. It should consider Parts II and III of this report, relating to the laws and to the judicial, police and prison systems, with a view to making such amendments and taking such action as may be necessary to meet the observations there made.
2. It should complete and put into force the following laws:
 - (1) Civil Code.
 - (2) Commercial Code (including Negotiable Instruments (Law, Maritime Law and Insurance Law).
 - (3) Revised Criminal Code.
 - (4) Banking Law
 - (5) Bankruptcy Law.
 - (6) Patent Law
 - (7) Land Expropriation Law.
 - (8) Law Concerning Notaries Public.
3. It should establish and maintain a uniform system for the regular enactment, promulgation, and rescission of laws, so that there may be no uncertainty as to the laws of China.

4. It should extend the system of modern courts, modern prisons and modern detention houses with a view to the elimination of the Magistrates Courts and of the old-style prisons and detention houses.

5. It should make adequate financial provision for the maintenance of courts, detention houses and prisons and their personnel.

III.—It is suggested that, prior to the reasonable compliance with all the recommendations above mentioned but after the principal items thereof have been carried out, the Powers concerned, if so desired by the Chinese Government, might consider the abolition of extraterritoriality according to such progressive scheme (whether geographical, partial or otherwise) as may be agreed upon.

IV.—Pending the abolition of extraterritoriality, the Governments of the Powers concerned should consider Part I, of this report with a view to meeting the observations there made and, with the co-operation of the Chinese Government wherever necessary, should make certain modifications in the existing systems and practice of extraterritoriality as follows:

1. Application of Chinese Laws.

The Powers concerned should administer, so far as practicable, in their extraterritorial or consular courts such laws and regulations of China as they may deem it proper to adopt.

2. Mixed Cases and Mixed Courts.

As a general rule mixed cases between nationals of the Powers concerned as plaintiffs and persons under Chinese jurisdiction as defendants should be tried before the modern Chinese courts (Shen Pao Ting) without the presence of a foreign assessor to watch the proceedings or otherwise participate. With regard to the existing special mixed courts, their organization and procedure should, as far as the special conditions in the Settlements and Concessions warrant, be brought more into accord with the organization and procedure of the modern Chinese judicial system. Lawyers who are nationals of extraterritorial Powers and who are qualified to appear before the extraterritorial or consular courts should be permitted, subject to the laws and regulations governing Chinese lawyers, to represent clients, foreign or Chinese, in all mixed cases. No examination should be required as a qualification for practice in such cases.

3. Nationals of Extraterritorial Powers.

(a) The extraterritorial Powers should correct certain abuses which have arisen through the extension of foreign protection to Chinese as well as to business and shipping interests the actual ownership of which is wholly or mainly Chinese.

(b) The extraterritorial Powers which do not now require compulsory periodical registration of their nationals in China should make provision for such registration at definite intervals.

4. Judicial Assistance.

Necessary arrangements should be made in regard to judicial assistance (including commissions rogatoires) between the Chinese authorities and the authorities of the extraterritorial Powers and between the authorities of the extraterritorial Powers themselves, e.g.,

(a) All agreements between foreigners and persons under Chinese jurisdiction which provide for the settlement of civil matters by arbitration should be recognized, and the awards made in pursuance thereof should be enforced, by the extraterritorial or consular courts in the case of persons under their jurisdiction and by the Chinese courts in the case of persons under their jurisdiction, except when in the opinion of the competent courts the decision is contrary to public order or good morals.

(b) Satisfactory arrangements should be made between the Chinese Government and the Powers concerned for the prompt execution of judgments, summonses, and warrants of arrest or search, concerning persons under Chinese jurisdiction, duly issued by the Chinese courts and certified by the competent Chinese authorities and vice versa.

5. Taxation.

Pending the abolition of extraterritoriality, the nationals of the Powers concerned should be required to pay such taxes as may be prescribed in laws and regulations duly promulgated by the competent authorities of the Chinese Government and recognized by the Powers concerned as applicable to their nationals.

Signed in the City of Peking,
September 16, 1926.

(Signatures)

For the United States of America, SILAS H. STRAWN
For Belgium, DR. A. VAN CUSTEM
For the British Empire, SIR SKINNER TURNER
For China, DR. WANG CHUNG-HUI

By signing this report my approval of all the statements contained in Parts I, II, and III is not to be implied.

For Denmark,
For France,
For Italy,
For Japan,
For the Netherlands,
For Norway,
For Portugal,
For Spain,
For Sweden,

L. P. TILLITSE
G. CH. TOUSSAINT
COM. G. DE ROSSI
SADAO SABURI
A. D. A. DE KAT ANGELINO
JOHAN MICHELET
J. A. DE BIANCHI
DON MANUEL ACAL Y MARIN
BARON CARL LEIJONHUFVUD

These recommendations are the result of careful investigation and observation by competent men. It will be noted that although Dr. Wang Chung-hui made reservations with regard to Parts I, II and III, he did not indicate any dissent from or reservations to Part IV quoted herewith. In view of the change of atmosphere in China and the undoubted progress made by the National Government, the time may be ripe to consider implementing Part IV, but it would be impolitic to ignore the work of this Commission or to take any steps in disregard of its recommendations. The Commission did not determine against the abolition of extraterritoriality; it provided a *modus operandi* for its accomplishment.

It is most unfortunate that just at this moment when the National Government raises the question of the abolition of extraterritoriality, that civil war has again broken out in China. The Kuangsi party challenged the authority of the National Government and were defeated at Wuhan, but they continued the war in the Southern Provinces and the provinces of Kuangtung and Kuangsi may be independent of the National authority at Nanking. At the same time, General Feng Yu-hsiang has blown up railway tunnels and bridges in Honan and is at war with Nanking, thus involving North and Central China in the war. Further to detract from China's good name was the reported shipment of £200,000 from Canton to Hongkong to prevent this money from falling into the hands of the Kuangsi troops who have occupied Canton.

Foreigners would be unwise to base their objections to the immediate abolition of extraterritoriality upon these incidents in China's civil wars. China is going through a fearful period in her history and needs the sympathy and support of all the Powers. Furthermore, the Nanking Government, as it exists at this moment, is a bulwark against Communism: its downfall would throw this country into chaos greater than that which brought foreign troops and vessels to China in 1926 and 1927. If the Powers can, by any step, support and strengthen the Nanking Government, this should be done irrespective of incontrovertible shortcomings. But the abolition of extraterritoriality involves the very existence of foreigners with their huge interests in China and should be accomplished by the sound and scientific processes recommended by the Strawn Commission.

DR. WANG'S NOTE

Dr. C. T. Wang's note to the Powers follows:—

Ministry of Foreign Affairs,
April 27, 1929.

Your Excellency:

I have the honor to recall to Your Excellency that the Chinese Government, through its representatives has had occasion to express at the Paris Peace Conference its strong desire for the removal of limitations on China's jurisdictional sovereignty imposed upon her by the old treaties concluded between China and the foreign Powers and that the Chinese Delegation emphatically reiterated the same desire at the Washington Conference which placed on record its sympathetic disposition towards furthering the aspiration of China for the removal of restrictions on her political, jurisdictional and administrative freedom of action.

With the unification of China and the establishment upon a firm foundation of the National Government, a new era has been happily inaugurated in the relations between our two countries through the conclusion of the recent Tariff Treaty, and it is to be confidently hoped that the material well-being of our two countries will henceforth be greatly enhanced. But it is the belief and the conviction of the Chinese Government that the promotion of such material wellbeing will be accelerated by a readjustment of the relations between our two countries on a basis of friendly equality in matters of jurisdiction, and if Your Excellency's Government could see its way to meet the wishes of the Chinese Government and people in this regard, it is certain that another obstacle to full and frank co-operation, in trade or otherwise,

between the Chinese people and foreign nationals in this country would be happily removed and that the desire of the Chinese Government for promoting to the fullest extent the material interests of all who choose to associate themselves with our own people would find its early realization.

It goes without saying that extraterritoriality in China is a legacy of the old régime, which has not only ceased to be adaptable to the present-day conditions, but has become so detrimental to the smooth working of the judicial and administrative machinery of China that the progress as a member of the Family of Nations has been unnecessarily retarded. The inherent defects and inconveniences of the system of consular jurisdiction have been most clearly pointed out by the Chinese Government on various occasions and also by the jurists and publicists of other countries in their official utterances as well as in their academic discussions. It is a matter for sincere regret that, while many Governments which are playing an important rôle in international affairs are eager and persistent in their endeavor to promote genuine friendship and harmony among nations such anachronistic practices as only tend to mar the friendly relations between the Chinese people and foreign nationals should be allowed to exist at a time when justice and equity are supposed to govern the relations of nations.

With the close contact between China and the foreign Powers, the assimilation of western legal conceptions by Chinese jurists and incorporation of western legal principles in Chinese jurisprudence have proceeded very rapidly. In addition to the numerous codes and laws now in force, the civil code and the commercial code have reached the final stage of preparation and will be ready for promulgation before January 1, 1930. Courts and prisons, along modern lines, have been established, and are being established, throughout the whole country.

Inasmuch as doubt has been entertained with regard to the advisability of relinquishing extraterritorial privileges at this juncture by the interested Powers, it may be pointed out that certain countries, having ceased to enjoy extraterritorial privileges in China, have given to their nationals by Chinese law and have had no cause for complaint that their interests have been in any way prejudiced. Your Excellency's Government may, therefore, rest assured that the legitimate rights and interests of your nationals will not be unfavourably affected in the least by the relinquishment of the exceptional privileges which they now possess.

As Your Excellency's Government has always maintained a friendly attitude towards China and has always shown its readiness in the adoption of measures for the removal of limitations on China's sovereignty, I am happy to express to your Excellency, on behalf of the Chinese Government, the desire of China to have the restrictions on her jurisdictional sovereignty removed at the earliest possible date and confidently hope that your Excellency's Government will take this desire of China into immediate and sympathetic consideration and favor me with an early reply so that steps may be taken to enable China, now unified and with a strong Central Government, rightfully to assume jurisdiction over all nationals within her domain.

I avail myself of this opportunity to renew to Your Excellency the assurance of my highest consideration.

(Signed) C. T. WANG.

Minister of Foreign Affairs.

It will be noticed that Dr. Wang ignores the report of the Commission on Extraterritoriality. This may be a question of policy or of politics. Dr. Wang may have gauged the fact that the Powers would probably offer to negotiate with him on the basis of the Strawn report and he may not have desired to show his irreducible minimum basis. He could not seriously have expected the United States, Great Britain, Japan and France to have written off extraterritoriality by one swoop.

In this connection, the following Japanese memorandum is important:—

The Japanese Minister has the honor, by the instructions of his Government, to communicate the following to the Department of Foreign Affairs of the National Government of China in reply to the latter's memorandum of August 14, 1928, on the subject of the Sino-Japanese Commercial Treaty.

1. The National Government of China, founding solely on the Chinese text, construe Art. 26 of the Sino-Japanese Commercial Treaty as providing that in case either of the Contracting Parties declares its intention of revising the Treaty and negotiation upon such revision is actually entered into within six months after the lapse of ten years, the Treaty shall no longer remain in effect; and they contend that inasmuch as the Government at Peking, in their note of October 20, 1926, proposed the revision of the Treaty, making at the same time a reservation of the rights that would automatically accrue to them in case a new treaty should not be concluded within six months as provided for in the old Treaty, they are unable to consent to the extension of the currency of the Treaty.

As was shown however, in the note of the Japanese Minister under date of July 31, 1928, it is quite clear both from the Japanese and English texts that in case the negotiations respecting the revision of the Treaty are not concluded within six months after the expiration of the ten years the Treaty and the Tariff are to remain in force for another ten years. The Japanese Government cannot but deeply regret that there should be any discrepancy of views upon a provision so free from ambiguity. If there is really any room for different interpretations between the Japanese and Chinese texts, the English text, by Art. 28 of the Treaty, is made decisive; and the English text, as above stated, being in complete accord with the Japanese, the Japanese Government feel confirmed in the correctness of their construction. Furthermore, as pointed out in their memorandum of July 31, 1928, the Japanese Government, in accepting by their note of November 10, 1927, the proposal of the Peking Government for the revision of the Treaty, made it clear that by virtue of Article 26 of the Treaty they declined to admit the Chinese reservation above mentioned, a point which they did not fail to emphasize at each succeeding extension of the period of negotiations. That

being the case, the so-called reservation of the National Government cannot in any way have modified the provisions of the Treaty or have affected its validity.

2. It would seem that the National Government, taking it as absolutely permissible both in law and by usage to repudiate or suspend a treaty in reliance on the "principle of altered circumstances," on the one hand propose the fundamental revision of the Sino-Japanese Commercial Treaty and, on the other, endeavor to maintain, on that principle, their contention regarding the lapse of the Treaty as set forth in their note of July 19, 1928.

But not only is the so-called principle of altered circumstances incapable of being regarded as an established rule of law in international relations, but the admission of such a principle would render almost all treaties liable to repudiation at the pleasure of either of the contracting parties, thus shaking the very foundations of international law. Nor is there any precedent where such a principle has ever had actual application. That there exists a specific provision concerning the validity of the Treaty shows, not that the possibility of circumstances being altered in the future was not taken into consideration—but that care was taken that no such alteration of circumstances should of itself render the Treaty null and void.

3. While the Japanese Government find it impossible to recede from the position they have hitherto taken on the question of the validity of the Sino-Japanese Commercial Treaty, they not only regard with the deepest sympathy the desire of the National Government to effect a revision of the treaty as soon as possible and so to enhance the friendly relationship between the two countries but themselves entertain the fervent hope that the Chinese people may speedily achieve their great task of constructing a new régime on a sound basis, so that there may be harmony and tranquillity at home and cordial intercourse with Japan. Should, therefore, the National Government show themselves so far regardful of mutual good relations between Japan and China as to consent to regulate Sino-Japanese relations in accordance with the provisions of the existing treaty and on that basis propose its revision, the Japanese Government would be quite prepared to entertain such proposal and enter into negotiations with a view to effecting such revision of the treaty as may be deemed appropriate.

April 26, 1929,

JAPANESE LEGATION.

MEMORANDUM

The Minister of Foreign Affairs of the National Government of China has the honor to acknowledge the receipt of the Memorandum of the Japanese Legation under date of April 26, the contents of which have been carefully noted.

The views and assertions of the National Government in regard to the construction of the Sino-Japanese Commercial Treaty were fully and clearly set forth in the memorandum addressed to the Japanese Minister under the date of August 14, 1928. The question of the validity of the Treaty is therefore so plain as hardly to call for further argument. In view, moreover, of the fact that understanding has been reached between the two Governments in regard to their difference of views on the legal aspect of the question, the Minister of Foreign Affairs has no intention to discuss the matter any further. Accordingly, the National Government are ready immediately and in all sincerity to enter into negotiations, in the hope that in the shortest possible time a new treaty may be concluded on the basis of equality and of mutual respect of sovereign rights.

April 27, 1929.

Department of Foreign Affairs
of the National Government of
China.

Native Goods in China

According to the Kuo Min News Agency, *all articles for public use in Government offices must hereafter be of native manufacture so as to encourage and promote the production and consumption of native goods, according to a petition submitted by the Ministry of Industry, Commerce and Labor to the State Council. The State Council is expected to issue an order shortly to the above effect.*

The question often arises, "What is native goods?" Chinese have, at times, tended to regard only such goods as "native products," which are manufactured by Chinese companies. But it is undoubtedly a fact that a very large percentage of the goods manufactured in China are the products of foreign-owned mills which are manufacturing cotton goods, electrical materials, tobacco products, cement, etc. These goods are produced by Chinese laborers, who participate in whatever income is derived from their sales, by the wages paid to them. In many instances, the raw material entering into the manufacture of these products, are grown in China, as for instance, in both the textile and tobacco industries. Finally, in the instance of both foreign and natively manufactured commodities, the distributing system is always Chinese and therefore, a very large share of the overhead cost of marketing is transferred to Chinese.

A much fairer and more accurate definition of a native product would be *any article manufactured in China irrespective of the ownership of the capital engaged in the particular enterprise.*

The Shanghai-Nanking Railway

Proposed Changes in Working and Loan Agreements

COMPLAINTS with regard to the management of the Shanghai-Nanking Railway, have been made from time to time and a campaign of quarrelsome recrimination was entered upon, the foreign staff accusing the Chinese and the Chinese staff accusing the foreigners of indifference and even corruption. To meet this situation, Mr. Sun Fo, Minister of Railways, appointed a Commission to investigate conditions on the Shanghai-Nanking and Shanghai-Hangchow-Ningpo Railway. The Commission composed of Messrs. T. C. Yen and C. S. Liu, Councilors of the Ministry, Mr. J. K. Choy, Director of the Department of Railway Administration, Messrs. Robert S. Norman, James Lockhart, John M. Weir, advisers to the Ministry, and Dr. P. H. Lo, Member of the Board of Commissioners of the Shanghai-Nanking Line with Dr. T. C. Yen as Chairman. The work of the Commission was to solve the following problems:—

1. Whether in the purchase of coal and other materials, there have been any irregularities and the means of improvements thereof.
2. The causes of delays in traffic and the question of responsibility.
3. Whether the General Manager and the foreign officers are competent, and whether they have over-stepped the scope of their duties, acted without authority, neglected the orders of the Authorities, and other irregularities.
4. Where the Loan Agreement and the Working Agreement need revision, and how they are to be revised so that the best results may be attained.

Having gone through thorough investigation, the Commission made voluminous reports to Minister Sun. The gist of them may be summed up as follows:—

IRREGULARITIES IN THE STORES. The present godowns in the chief store at Woosung are inadequate for the needs of the Railways. Two perfectly good godowns which might be advantageously employed for storage are lying idle for a long time. The weigh-bridge, though available for taking coal deliveries, was not used at all. Instead, a slow and inefficient method of taking coal deliveries by means of baskets was used. That led to a great deal of leakage. No coal yard, suitable for the purpose, exists at Woosung.

For many years before the present administration, only one fine of ten cents per ton was ever levied on the contractors for the supply of coal, although it was very much inferior to the guaranteed standard and originally a fine of \$1.60 per ton was recommended. The specifications for coal were not so prepared that local dealers could easily comply with the conditions. The stipulations of penalties, in case of failure to fulfill the specifications were not strictly enforced.

Cases are frequent where irregularities and disobedience of Ministerial instructions obtained in store purchasing. The General Manager even went so far as to ratify an unauthorized and illegal transaction of nearly \$200,000 by the late Chief Storekeeper, Mr. Cook. This indicates the extent of slackness on the part of the general Management. The General Manager consistently hampered the purchase of the Da-Qun-Lun coal and took the Fushun coal from Old Yung Chong although the Managing Director's instructions were to purchase the former.

RECOMMENDATION FOR THE STORES.—The Shanghai-Nanking Line consumes annually about 100,000 tons of coal and the Shanghai-Hangchow-Ningpo Line about 80,000 tons. Both together cost more than \$2,000,000. The Commission recommended that some arrangement be made whereby coal could be purchased directly from the mines instead of through coal dealers in Shanghai. It found that the Chung Hsin coal seemed to be most suitable from the analyses made because of the location of its mines. But to remove the monopoly of the sale now belonging to the Ta-Lu Coal Company, the Commission recommended to have some arrangement made whereby the loan made to the mines by the company could be repaid, so that the railway may be free to buy directly from the mining company. This would lower the price, make the quality uniform and obtain a steady supply of coal.

It is also recommended that a new system of taking delivery, storing, and issuing of coal should be established to prevent irregu-

larities as much as possible and that once the coal is issued to the engine sheds, it be in the charge of the Locomotive Department instead of still remaining with the Store Department.

IRREGULARITIES IN TRAFFIC.—In traffic matters, the Commission found that the management has persistently evaded its responsibilities. The weigh-bridge of the Railway which has been out of order for a number of years and reports on defective conditions of which have been repeatedly made, stands unrepaired. The reliance on the small scale, in exclusion to weigh-bridges, has made it impossible to have a complete check on the weigh of goods consignments. The investigation revealed a great number of instances of very considerable excess weight over the recorded weight.

Train delays for the past year, from January 1928 to January 1929 were frequent, amounting to 82 per cent. of the total number of trains run. Of these delays 50 per cent. was due to crossing and waiting, 24 per cent. to running slow, and the rest to other causes. The new Railway authorities, had to try to break up the ring by using Shantung coal mixed with that from the Fushun mines. Records show that there had been train delays throughout the year, as well as during previous years, but that they had been aggravated during last January. The causes of these delays are:—

1. Failure of the Store Department to have the coal mixed according to specific proportions.
2. The number of coaches, and sometimes private cars, attached to the train is too great.
3. During the winter months, slippery rails were prevalent.

It is true that the Shantung coal is high in ash and easily clinkers when used alone but this could have been easily avoided if the mixture had been faithfully carried out.

Other irregularities were discovered which reflect on the efficiency of the general management, such as the granting of exclusive rights and special privileges to certain companies to transport specie and parcels. The general management should be held accountable for the responsibilities entrusted to it and more definite regulations should be framed and strictly carried out in order to prevent the recurrence of similar irregularities. Recommendation on the general management will be dealt with separately.

ENGINEERING, THE LEAST UNSATISFACTORY DEPARTMENT.—The present water supply system is very unsatisfactory. The fish-plates are too thin in section to match the 85-lb. rails. The spacing of sleepers is too far apart. Most stations are inadequate to meet the present passenger traffic. The Managing Director has no knowledge of repairing works and new minor work now given to a few contractors who generally monopolize them, nor is he able to keep a check on any capital engineering work in progress.

In the Mechanical or Locomotive Department, it was found that the grate bars now in use for the locomotives are not suitable; that the 52 locomotives of the Railway are not sufficient to meet the demand of traffic; that there are no machine tools at any of the engine sheds so that when repair work of any kind is required, the engine has to run to the Woosung workshop; that there is no car repair shop, all car repairs being conducted in the open; and that the shops at Woosung are very inadequate, poorly equipped and badly located, being at one end of the line.

RECOMMENDATIONS FOR THE ENGINEERING DEPARTMENT.—The Managing Director should be fully informed of any work already or yet to be given out, and has the right to voice his approval or disapproval of any proposed work. Public tenders should be called for making repairs and new works costing over a certain specific amount as set down by the Regulation promulgated by the Ministry of Railways.

Any work on the rebuilding of the Nanking station should be of a temporary nature. The question of removing it to a more suitable location preferably into the city of Nanking should be taken up and dealt with.

Emphasis must be made of the necessity of changing the rigid fire bars of the locomotives to rocking bars so that coal obtainable in the country can be used with efficiency. The change will cost only about \$600 per locomotive as estimated by the locomotive Superintendent, and it is to be regretted that this has not been done before. A careful study of the fire box and ash pans should also be made when ordering new locomotives.

Instead of double tracking the Line, the Commission recommended the purchase of more locomotives, the installation in the various engine sheds of sufficient machinery to take care of light repairs, and the building of a car repair shop of up-to-date design so that cars can be repaired under protection against bad weather.

The Commission also recommended the removal of the Workshops and Stores at Woosung to a more suitable place be considered before spending any sum of money on their extension. As Woosung will inevitably develop into a shipping port, the space now occupied by these workshops will be required for traffic purposes and their location is not central enough for efficient use. Strong recommendation on their removal was made.

ACCOUNTING.—This department was found in rather good condition as far as the working of the accounting system in the office is concerned. Since lack of time prevented the Commission to have an intensive study of the organization and its working outside the office, it was recommended that travelling auditors directly responsible to the Ministry be sent to check all accounts in the office as well as in the stations.

UNFAIR TREATMENT IN MEDICAL ATTENTION.—The medical officer, who is a member of a British medical firm, spends very little time on the Railway. Arrangements for Railway in-patients in Shanghai and other localities along the Line are inadequate. Discrimination has been made among the railway employees, the foreign staff being allowed to choose their own hospital and doctors at the Railway's expenses. The medical department, on the whole, is inefficient.

RECOMMENDATION FOR THE MEDICAL DEPARTMENT.—This department, together with its personnel should be completely reorganized. In order faithfully and efficiently to execute his duties, the chief medical officer should be a qualified full-time doctor, preferably a Chinese as he has to do mainly with Chinese employees. A careful survey of all hospitals in Shanghai should be made and the most suitable one selected for Railway in-patients in the locality. All the hospitals and dispensaries including the personnel should be thoroughly surveyed and reorganized when necessary. All Railway employees, regardless of nationality should be accorded the same medical service.

GENERAL IRREGULARITIES.—It has been shown that after investigation of the various departments, the general management has in some respects over-stepped its duties, acted without authority, neglected the orders of the authorities and committed other irregularities, detrimental to the interest of the Railway. The refusal to pay house rent, the taking of privileged leave by the General Manager, the appointment of travelling auditor without the Managing Director's sanction, the reluctance of the General Manager to deal with the Hongkong and Shanghai Bank for loss sustained in connection with stolen and forged checks, and the unhealthy attitude and adverse criticism of the General Manager and the Traffic Manager toward the Ministerial Order requiring the joint

signature of the departmental chiefs and the assistant chiefs are singular instances of the General Management's irregularities.

GENERAL COMMENDATIONS.—"In short, the investigation of the Commission discloses a long record of differences between the Chinese and foreign interests of the Railway, which differences clearly impair the efficiency of the service and are as detrimental to those financially concerned in the Railway as they are to the Chinese Government." The Commission believed that these can be largely attributed to the existing Loan and Working Agreements. Although the basic solution lies in the revision of these agreements, the following temporary measures for the improvement of the existing conditions are recommended:—

- "1. The office of General Manager should be abolished, as its existence lends to delay and duplication of work, confusion and friction, and the concurrent holding of the office of Engineer-in-Chief and General Manager deprives the Railway of a system of checking so desirable in efficient management.
- "2. Such powers as are delegated to the Managing Director to the Board of Commissioners should be clearly defined, so that no question of subjecting his actions to the review of the Board could possibly arise. In case of disagreement between Chinese and British members, the matter should be referred to the proper governmental agencies whose decision shall be final.
- "3. The appointment and dismissal of all officials and/or employees of the Railway should be made by the Managing Director, with the exception of the Engineer-in-Chief and Chief Accountant, who may be nominated by the Corporation and appointed by the Managing Director. The title of Engineer-in-Chief should be replaced by that of Chief Engineer, who will be in charge of Maintenance of Way and Works.
- "4. All officials and employees should be accorded the same treatment, without any discrimination whatsoever.
- "5. Joint responsibility for all payments should be accepted by the Managing Director and the Chief Accountant.
- "6. The provision in reference to the purchase of foreign materials, the payment of loans by the Railway and the net-profit certificates should be amended.
- "7. We are convinced that it is highly advisable to amalgamate the Shanghai-Nanking and the Shanghai-Hangchow-Ningpo Lines, to simplify the control, increase the efficiency and reduce the working expenditure. In order to make this practicable, it is necessary for the Loan Agreements of both Lines to be amended with this object in view."

Minister Sun Fo is giving serious consideration to the recommendations. It is hoped that these suggestions looking forward to a betterment of the administration and improvement in the services of the railways concerned will be carried out at an early date.

The foreigners associated with the management of the Railway have made no statement of their side of the case. Mr. A. C. Clear, the General Manager and Engineer-in-Chief resigned and Mr. I. Tuxford, who had been associated with the Railway, since 1904, has been appointed to fill the vacancy.

China's New Aviation Contracts

American Company to Operate Air-mail Service on Three Routes: to Fly 3,000 Miles a Day: Chinese Aviators to be Trained

THE air-mail contract between the Chinese National Aviation Corporation and Aviation Exploration Inv., is of exceptional importance because it lays the basis for future contracts of a similar nature in China.

In accordance with the basic principle of the National Government a franchise can be granted to a foreign country to operate a

public utility as such a franchise might entail questions of sovereignty and of political relationships. In this contract then a means was found for the granting of a franchise. For this purpose, a Chinese Government Corporation incorporated by special Charter of the National Government, namely, Chinese National Aviation Corporation, was created with Mr. Sun Fo, Minister of Railways as its President. This new corporation has entered into

an agreement with the Aviation Exploration Inc., an American Corporation, existing under the laws of the State of Delaware and affiliated with the Curtiss group of aviation companies in the United States. In accordance with this agreement the American company becomes the operating concern, while the franchise is held by the Chinese company. The agreement is guaranteed by the National Government in accordance with Article 12. It is further provided in Article 26, that the agreement must be ratified by the State Council of the National Government, which shall approve the terms of the contract and guarantee its faithful execution by the Chinese Corporation. This procedure is taken to indicate that although the Government is not a party to the agreement, the Government is liable for its fulfillment.

Two criticisms of this agreement have been made, undoubtedly by competitors of American plane manufacturers, for the purpose of creating the impression in China that the agreement is not beneficial to China. These criticisms dealing with two aspects, one, that the American Company is liable to use improper and unsuitable equipment and the other that only Americans can be employed by the operating company.

Articles 9 and 13, of the agreement fully answer these criticisms. Article 9 reads:—

Section 1.—The Company agrees to use only up-to-date first-class and efficient equipment, of Chinese or foreign make, suitable for the carrying on of this service. There will be held in reserve at appropriate cities on the routes a number of planes, motors, and parts for emergency work. Only new equipment will be imported for this purpose.

It will be noted that the operating company is not bound to use only American planes. In fact, it is suggested that they might use Chinese planes, if suitable. They are also bound to provide new equipment and the Chinese Company will undoubtedly provide a means of determining whether the equipment is efficient.

As regards the second criticism, it will be noted that under Article 13, it is stated:—

Section 1.—It is the definite policy of the Company to use Chinese personnel just as soon as such qualified personnel is available. If it is possible, the Company will start using Chinese personnel from the beginning.

In this contract it is agreed to establish a flying school in the City of Nanking for the specific purpose of training a Chinese staff for aviation purposes. This not only involves the question of the desire of the Chinese Government to employ Chinese, but also the question of overhead expenses of bringing a large corps of Americans from the United States to China for permanent residence in this country will undoubtedly increase the over-head charges of the enterprise.

Attention must also be called to the fact that this agreement has no monopoly features. Specific routes are outlined and provision is made for increasing the routes and the operating company is protected against direct competition upon these and parallel routes; but it must be noted that China is an enormous country and although this contract covers the most favoured routes, it does not cover all the profitable ones. There is, therefore, considerable room for expansion.

The contract does not involve a loan agreement, but at the same time, the American Company agrees to extend credit to the Chinese Company at an amount not exceeding G.\$2,000,000, for the bonds guaranteed by the Minister of Finance, are to be issued. The contracts in full are published herewith:—

AIR MAIL CONTRACT

BETWEEN

THE CHINA NATIONAL AVIATION CORPORATION

AND

AVIATION EXPLORATION, Inc.

ARTICLE 1.

Section 1.—This contract made between the China National Aviation Corporation, a Chinese Government Corporation, incorporated by special charter of the National Government, Republic of China, hereafter referred to as the Chinese Corporation; and Aviation Exploration, Inc., a Corporation duly organized and

existing under the laws of the State of Delaware, U.S.A., hereafter called the Company, as follows:

ARTICLE 2.—INITIAL ROUTES

Section 1.—Within six months from the date of this contract the Company agrees to have the necessary equipment ready for immediate operation of the following three initial air mail routes:

1. Shanghai via Nanking to Hankow
2. Nanking via Hsuechowfu, Tsinan, Tientsin to Peiping
3. Hankow via Changsha to Canton

Section 2.—The Chinese Corporation agrees to furnish, equip, police, maintain, and have ready for operation adequate airports at the above named cities, and adequate intermediate landing fields at intervals of not more than 100 miles, within the specified six months period. Should either party to the agreement fail to be ready at the expiration of the six months, it shall pay to the other party liquidated damages in the sum of \$2,500 gold for each day of delay. In the case of the Company, this sum represents the actual loss to the Company in expenses should such delay occur.

Section 3.—Should either party to the contract be prevented by "force majeure" from commencing operations within the stipulated period of six months, the party or parties shall be free from liability under this Article for any reasonable delays caused by the "force majeure."

Section 4.—Should the Chinese Corporation and the Company mutually agree to a modification or relocating of any of the routes mentioned in Section 1 of this Article, either before or after they are in operation, this may be done subject to all the provisions regarding the original three routes named, and preserving the principle of a minimum of 3,000 flying miles daily, as per Article 6.

ARTICLE 3.—FUTURE ROUTES

Section 1.—If the Chinese Corporation so desires, after the above three air routes are in operation, it is agreed that the Company shall operate, under the same terms and conditions as the initial routes, an extension of the routes from Peiping or Tientsin to Harbin, via Mukden; and from Shanghai to Canton, via Ningpo or Wenchow, Foochow, Amoy, and Swatow, provided that such additional lines shall be in continuous operation for the not less than two years from the date of the inauguration of this new service.

Section 2.—It is understood and agreed that the Chinese Corporation shall give the Company reasonable notice before starting service on any part of these routes in order to enable the Company to provide the necessary additional equipment, personnel, and organization needed.

Section 3.—It is further agreed that the Chinese Corporation shall provide, equip, police, maintain, and have ready adequate airports and intermediate landing fields at intervals of not more than 100 miles on these additional above specified routes by the time the service is to start.

ARTICLE 4.—INTERMEDIATE STOPS

Section 1.—The Chinese Corporation shall have the right to increase or decrease the number of intermediate stops on any route, but such increase or decrease shall be made only after the Chinese Corporation has provided adequate airports and facilities.

ARTICLE 5.—RESTATING DISTANCES

Section 1.—It is hereby further stipulated and agreed that whenever an existing stop is discontinued, or an additional stop added, in accordance with the provisions set forth in this contract, the distance over the route will be restated in accordance with Article 7, and payment for the miles of flying will be made on the basis of this revised figure.

ARTICLE 6.—MINIMUM FLYING MILEAGE

Section 1.—It is understood that the schedule of this service is to comprise at least one airplane on each route in each direction per day, including Sundays and other public holidays. The Chinese Corporation guarantees compensation based on a minimum of 3,000 flying miles daily; and the Company agrees to fly a minimum of 3,000 miles daily, subject to the conditions of Article 15.

ARTICLE 7.—MEASURING DISTANCES

Section 1.—It is further stipulated and agreed that the distance for the purpose of computation of payment to the Company shall

be considered as from center of city to center of city (designated as stops on the route) in an air line.

ARTICLE 8.—AIRPLANE MARKINGS

Section 1.—The Company agrees that all airplanes and seaplanes used by the Company on its routes operated under this agreement shall bear in Chinese the name of the Chinese Corporation and other special marks and markings designed by the Chinese Corporation in order to distinguish them from other airplanes and seaplanes used by the Government services.

ARTICLE 9.—EQUIPMENT

Section 1.—The Company agrees to use only up-to-date first-class and efficient equipment, of Chinese or foreign make, suitable for the carrying on this service. There will be held in reserve at appropriate cities on the routes a number of planes, motors, and parts for emergency work. Only new equipment will be imported for this purpose.

ARTICLE 10.—COMPENSATION

Section 1.—The compensation to the Company for equipping and operating the air mail service shall be \$1.50 gold per mile for every mile flown on scheduled or special flights, interrupted, and resumed flights, for small planes with carrying capacity up to 800 lbs., and \$2.25 gold per mile flown for planes with carrying capacity of 800 to 2,000 lbs.; from 2,000 lbs., to 2,800 lbs., load, \$3.75; from 2,800 lbs., to 4,000 lbs., load \$4.50. For all loads over 4,000 lbs., the compensation to the Company is to be increased, based upon the above rate bases.

ARTICLE 11.—COMPENSATION FOR INTERRUPTED FLIGHTS

Section 1.—It is understood that the Company will be compensated for services rendered, meaning the actual miles flown on scheduled and special flights, interrupted and resumed flights whether completed the same day or not, and if for any reason beyond the control of the Company a minimum of 3,000 miles of flying is not maintained daily, the Company will receive compensation only for the amount of mileage that has been flown, or service rendered.

ARTICLE 12.—METHOD OF PAYMENT

Section 1.—The Chinese Corporation agrees to pay to the Company on or before the 15th day of each month the compensation due the Company for services rendered under this contract for the preceding calendar month, and any accrued balance up to the first of the current month.

Section 2.—Until such time as the postal receipts for air mail shall equal or exceed the compensation paid the Company for this service under this contract, the Chinese Corporation shall pay to the Company in cash on or before the 15th of each month, the total postal air mail receipts for the preceding month. For the difference between these receipts and the compensation due the Company each month, the Chinese Corporation shall give its promissory note, in gold dollars of the United States of America, maturing in not more than eight years and bearing interest at the rate of eight per cent. payable semi-annually. These notes shall be unconditionally guaranteed by the Chinese Government, acting through the Minister of Finance, or other duly authorized minister of the Government, and shall be specifically secured by the air mail receipts. In no case shall the aggregate of these notes exceed \$2,000,000 gold. Should the air mail receipts exceed the compensation paid the Company, the balance shall be applied immediately to taking up any notes outstanding. The Chinese Corporation shall have the privilege of taking up any or all of these notes at any time before maturity, by paying the principal and accrued interest.

Section 3.—For the purpose of this contract, the air-mail receipts shall be calculated by multiplying the number of pounds of air mail carried by the Company by 40 (as the average number of letters per pound), and this multiplied by the air mail rate per letter.

ARTICLE 13.—CHINESE PERSONNEL

Section 1.—It is the definite policy of the Company to use Chinese personnel just as soon as such qualified personnel is available. If it is possible, the Company will start using Chinese personnel from the beginning.

ARTICLE 14.—REPAIR SHOPS

Section 1.—On or before the inauguration of the air mail service, the Company agrees to erect and equip all necessary shops

for the assembling, care, overhaul, and maintenance of the airplanes and motors to be used in this service.

ARTICLE 15.—AIRPORTS

Section 1.—On all airports and intermediate landing fields that are provided by the Chinese Corporation under this contract, it is agreed that an adequate space shall be allotted to the Company during the life of this contract, on which the Company may erect the necessary hangars, shops, and buildings, required for furnishing efficient service. The Company agrees to pay a reasonable rental for this space.

ARTICLE 16.—FLYING CONDITIONS

Section 1.—Whenever the Company considers the weather conditions are unsafe for flying, endangering life and property, it reserves the right to discontinue any flights already started and suspend flying activities until such time as the weather clears. Notice of such discontinuance or suspension of flying shall be sent to the nearest post office concerned.

Section 2.—The flying contemplated under this contract is understood to be daylight flying only. If, at some future time, when adequate facilities for night flying have been provided, it is desired to inaugurate night flying service, the terms and conditions of this service, and the compensation therefor, shall be the subject of further agreement between the parties.

ARTICLE 17.—DELIVERIES TO COMPANY

Section 1.—It is understood that the service under this contract is purely for air transportation and does not include any land or water transportation. The Chinese Corporation agrees to transport to and from all airports the mail, passenger, or freight cargo that is carried by the Company. The Chinese Corporation agrees to give the Company reasonable notice, whenever possible, as to the amount and character of mail, passengers, and goods which it expects to deliver for air transportation in order that the Company may have time to make adequate preparation for handling it.

ARTICLE 18.—PROTECTION

Section 1.—The Chinese Corporation will provide efficient protection for the work, operation, and all properties of the Company, as well as for the Chinese and foreigners employed thereon.

ARTICLE 19.—TAX

Section 1.—No tax or impost of any kind shall be levied upon the property or operations of the Company, or the compensation received under this contract.

Section 2.—Should any import duty be levied upon the property of the Company imported for this service, the compensation paid by the Chinese Corporation to the Company shall be increased by an amount equal to the import duty paid.

ARTICLE 20.—EXCLUSIVE RIGHTS

Section 1.—The Chinese Corporation grants to the Company the exclusive right to carry all air mail on the routes specified in this contract; and any and all extensions of these routes referred to in Article 3, if and when granted by the Chinese Corporation. Should the Chinese Corporation grant any further air mail routes to the Company, it shall be on the same exclusive basis. It is understood and agreed that no parallel or directly competing routes for air mail shall be operated by any company or person other than this Company.

ARTICLE 21.—RADIO

Section 1.—The Company is granted the right to maintain, import, and operate low-powered sending and receiving radio sets and radio phones, to be used exclusively for maintaining the efficiency of the Company's service, in communicating between stations and with its planes. It is understood and agreed that no commercial messages, or any other messages not directly connected with the Company's operations, shall be sent. A suitable wave length or wave lengths shall be assigned for the Company's use.

ARTICLE 22.—LIABILITY

Section 1.—The Company is charged with the duty to exercise, and agrees to exercise, the utmost care and diligence to see that no contraband of any description, such as arms and ammunition, opium and its derivatives, salt, etc., be carried at any time in any of its planes, or stored on its premises. When the Company shall

have exercised such due diligence, and is guilty of no neglect, it shall be held free from legal liability.

ARTICLE 23.—ARBITRATION

Section 1.—Should any disagreement arise under this contract, the question shall be referred to arbitration. One arbitrator shall be chosen by the Chinese Corporation and one by the Company. These two shall select a third arbitrator (of any nationality), and a majority shall decide.

ARTICLE 24.—LIFE OF CONTRACT

Section 1.—This agreement shall be in force for ten years from date hereof, but unless either side gives to the other a written notice at least two years prior to the expiration of the ten years, of its intention to terminate it, the agreement shall automatically continue in force for five years after the ten year limit.

ARTICLE 25.—ASSIGNMENT OF CONTRACT

Section 1.—The Company may assign its right, title, and interest in this contract, to a new American Corporation to be formed for the purpose of executing its provisions; but the contract shall not be assigned to any company or person other than this new American Corporation without the written consent of the Chinese Corporation.

ARTICLE 26.—RATIFICATION BY GOVERNMENT

Section 1.—This contract shall have no force and effect until the National Government, Republic of China, by an order of the State Council, shall have approved the terms of this contract, and guaranteed its faithful execution by the Chinese Corporation.

ARTICLE 27.—TEXT

Section 1.—This contract is executed in quadruplicate, in Chinese and English; two sets to be retained by the Chinese Corporation; and two by the American Company. Should any doubt arise as to the interpretation of this contract, the English text shall be accepted as the correct one.

Done at Nanking, this 17th day of April, 1929, being the 17th day of the Fourth Month of the 18th year of the Republic of China.

CHINA NATIONAL

AVIATION CORPORATION

(Signed) SUN FO, *President*

AVIATION EXPLORATION, INC.

(Signed) WILLIAM B. ROBERTSON, *President*

(Signed) R. R. RIGGS, *Secretary*.

CONTRACT BETWEEN

THE CHINA NATIONAL AVIATION CORPORATION

AND

AVIATION EXPLORATION, INC.,

FOR THE ESTABLISHMENT AND OPERATION OF

FLYING SCHOOLS, FACTORIES, AND AERIAL TRANSPORTATION

This contract made between the China National Aviation Corporation, a Chinese Government Corporation, incorporated by special charter of the National Government, Republic of China, hereafter referred to as the Chinese Corporation; and Aviation Exploration, Inc., a Corporation duly organized and existing under the laws of the State of Delaware, U.S.A., hereafter called the Company, as follows:

ARTICLE 1.—AUTHORITY TO OPERATE

Section 1.—The Company agrees, and the Corporation grants the authority, to establish and operate flying schools at appropriate times and places throughout China, subject to the previous written authorization of the Corporation. The Corporation grants the Company the privilege of engaging in all usual branches of the commercial aviation industry, including the purchase or sale (for export or for import) or repair, of airplanes, motors, parts and accessories, the aerial transportation of passengers and/or

goods, this privilege, however, does not imply the granting of any vested right, but may be modified or revoked, subject to Article 6.

ARTICLE 2.—AIRCRAFT FACTORIES

Section 1.—The Company offers to co-operate with the Corporation in every way in the establishment of aircraft factories in China. With this in view, the Company agrees to erect and operate, for a just and reasonable compensation, a factory or factories for the manufacture of aircraft, conditional on the Corporation's providing the necessary capital and proper site for the factory; or, if the Corporation prefer, the Company will erect, equip, and operate such factory or factories at its own expense, provided the Corporation guarantee the Company sufficient orders to enable it to continue in operation with a reasonable return on its investment. If the Corporation should wish to erect and operate such a factory on its own account, the Company will gladly aid it in every way, giving it the benefit of the Company's experience and technical knowledge.

ARTICLE 3.—AIR PORTS

Section 1.—At all air ports where facilities are granted to other commercial companies or individuals, the Corporation will see that adequate space is allotted to the Company for necessary buildings in connection with the operation of its flying schools, repair shops, and aerial transportation; and for the accommodation of passengers and the personnel of the Company.

ARTICLE 4.—RADIO

Section 1.—The Company is granted the right to import, maintain, and operate low powered sending and receiving radio sets and radio phones, to be used exclusively for maintaining the efficiency of the Company's service, in communicating between stations and with the planes. It is understood and agreed that no commercial messages, or any other messages not directly connected with the Company's operations, shall be sent. A suitable wave length or wave lengths shall be assigned for the Company's use.

ARTICLE 5.—LIABILITY

Section 1.—The Company is charged with the duty to exercise, and agrees to exercise, the utmost care and diligence to see that no contraband of any description, such as arms and ammunition, opium and its derivatives, salt, etc., be carried at any time in any of its planes, or stored on its premises. When the Company shall have exercised such due diligence, and is guilty of no neglect, it shall be held free from legal liability.

ARTICLE 6.—TAXES AND REGULATIONS

Section 1.—The Corporation and the Company mutually recognise the principle of equality of opportunity in commercial aviation as between companies or persons of any nationality whatsoever. With this in view, the Corporation guarantees to the Company that its property, operations, or personnel will not be subjected to any tax, import, regulation, license, or restriction of any nature which is more burdensome than that under which any other company or person holds property or operates.

ARTICLE 7.—ARBITRATION

Section 1.—Should any disagreement arise under this contract, the question shall be referred to arbitration. One arbitrator shall be chosen by the Corporation and one by the Company. These two shall select a third arbitrator (of any nationality), and a majority shall decide.

ARTICLE 8.—TEXT

Section 1.—This contract is executed in quadruplicate, in Chinese and English; two sets to be retained by the National Government of the Republic of China; and two by the Company. Should any doubt arise as to the interpretation of this contract, the English text shall be accepted as the correct one.

Done at Nanking this 17th day of April, 1929, being the 17th day of the fourth Month of the 18th year of the Republic of China.

THE CHINA NATIONAL

AVIATION CORPORATION

(Signed) SUN FO, *President*

AVIATION EXPLORATION, INC.

(Signed) WILLIAM B. ROBERTSON, *President*

(Signed) R. R. RIGGS, *Secretary*

Some Thoughts Concerning Economics in the Development of China

By Dr. J. A. L. Waddell

[The First Instalment of this Series was Published in the April Issue of "The Far Eastern Review."]

III.—Foreign Loans for Specific Enterprises in China

CHINA'S development, if carried out with her own money entirely independently of foreign capital, will, of necessity, be exceedingly slow, for her revenues are comparatively small and the demands for money to use on both reconstruction and new enterprises are enormous. It is evident, therefore, that she must look abroad for funds if she is to effect, even to a small degree, the worthy accomplishments now contemplated by the National Government. To what country should she turn to borrow money? Evidently to the United States of America, the old friend of the Chinese nation, for that country possesses to-day the great bulk of the world's wealth, and it is essential that she lend to foreigners any surplus that cannot be profitably employed at home. This she has been doing on a large scale during the last decade. Why then not lend it to China? The answer to this query I am prepared to give authoritatively; for a short time ago, when in Chicago, I called upon two large banking and investing firms whom my partner and I number among our clients, and asked them whether they would care to lend money on Chinese bonds issued for specific enterprises.

The reply was quick and unhesitating—"neither we nor any other American capitalist would consider favorably the flotation of any loan for China until that country institutes some satisfactory means of paying its financial indebtedness." In reply I remarked that eventually China would be sure to pay all legitimate debts contracted by her governments; because Chinese business men have an established reputation the world over for strict honesty in their financial dealings, deeming it a deep disgrace to default on the payment of any money either borrowed or pledged in any way. To this statement my friends replied thus—"you should have used the word 'had' instead of 'have', because what you say was true enough before the World War, but, unfortunately, it no longer holds good, for China's credit to-day is simply nil everywhere. She must establish a permanent government and reform her present business methods before she can expect to borrow anywhere money in large amounts."

Thereupon I told my financial friends that I anticipated truly important results from the Nationalist Government's administration, because I was personally acquainted with a number of the men in power, having met them, both collectively and individually, in Canton about the end of 1921, and having been strongly impressed by their evident patriotism, ability, and honesty of purpose. I said also that my call to China in an advisory capacity would probably result in my recommending to the Government the undertaking of a number of projects involving engineering constructions that would require foreign capital for their materialization; and that if, meanwhile, the then existing unfavorable conditions were to change materially for the better, I would like to have the privilege of calling their attention to the recommended projects in the hope of their revising their adverse decision. To this suggestion they agreed; and that is the way in which the matter stands, as far as those capitalists are concerned.

It is axiomatic in the financial circles of New York, Boston, Chicago, and Philadelphia that, if any member of the great banking group learn about an important project, the other members thereof soon know about it also, and that the fundamental policies of these various capitalists are in harmony. It is, therefore, fair to assume that the dictum of my Chicago banking friends is true, and that their statement concerning the general reluctance of American capitalists to lend money for Chinese enterprises is trustworthy.

Such being the case, and it being essential for the development of China that she borrow large amounts of money abroad, it is evident that some radical step will have to be taken without delay to re-establish her financial credit in the eyes of the world. What that step should be is not difficult to state—it is for the Government to make without delay a list of all moneys borrowed or indebtednesses incurred by its predecessors in office, go through this list carefully and blue-pencil any claims that are, beyond doubt, illegitimate; such, for instance, as moneys borrowed or seized by the War Lords for their selfish military purposes during the "late unpleasantness," but including all unpaid bills for materials purchased from either foreign or Chinese firms. Then establish a fund for the redemption of these indebtednesses by annual payments of both principal and interest, the money for so doing being guaranteed by the revenues from the lately increased customs duties. Or it might be well to make a special issue of redemption bonds with the said revenues as backing, and pay in full without delay all old obligations. The latter method would be the more effective of the two in establishing China's credit abroad, especially if the redemption bonds could be sold wholly or in part to citizens of China. It would be difficult at present to dispose of the entire issue abroad, even though it were known that the money from the bonds would be used solely for debt redemption purposes; hence it is almost obligatory to persuade Chinese bankers to subscribe liberally to the loan. It seems hardly necessary to remark that the spending of any of the proceeds of the sale of these bonds for any other purpose whatsoever would be an absolutely suicidal policy and an unpardonable breach of faith.

All loans made to China will undoubtedly be safe-guarded by the grantors, so as to ensure that the money therefrom is expended strictly for its legitimate purpose, and that the revenues from the consummated enterprise are honestly collected and disposed of as per agreement.

In issuing bonds in China for specific purposes, it will be advisable to determine in advance the country in which they will mainly be sold, and then issue them in the currency of that country; for the purchasers there would not be willing to buy securities based upon a fluctuating currency. Of course, the Chinese buyers, on the other hand, might prefer to purchase bonds based on the currency with which they do business; but they ought not to object to taking securities founded on the American dollar or the English pound sterling.

As an example of an important Chinese enterprise to be financed, I might take the case of the proposed bridges over the Han and Yangtze Rivers between Hankow, Hanyang, and Wuchang, concerning which I reported to the Peking Government on October 26, 1921, and to the National Government at Nanking on February 14, 1929.

The estimated cost in Chinese money at the present time in round figures is twenty millions of dollars. The way I suggested to His Excellency, Sun Fo, Minister of Railways, for financing the project is most easily explained by the following quotation from the aforesaid report made to him:

"I suggest that the proposed structures be made toll bridges for vehicles of all kinds, including man-propelled ones, but free for pedestrians, and that the charges in Chinese money be as follows:

" For jinrikishas and one-man carts	..	..	10 cts.
.. each extra man pulling a cart	..	..	5 "
.. horse-propelled passenger vehicles..	..	..	25 "
.. horse-propelled freight vehicles, with either	..	..	..
one or two horses	..	..	35 "

" For each additional horse above two pulling a vehicle	10 "
„ passenger automobiles	40 "
„ trucks up to five (5) tons of 2,000 pounds..	50 "
„ each additional ton in excess of five for trucks	10 "

"These figures apply to traffic over both bridges or over the Yangtzekiang bridge only; but, for passage over the Han River bridge only, they might be halved."

"I figure that the cost of the project should, in equity, be equally divided between the three cities jointly and the Ministry of Railways of the National Government, making \$10,000,000, Mex., for each.

"*In re* the cities' contribution, I suggest that they jointly contribute *in advance* \$5,000,000 Mex., in cash, to be placed in a bank at interest and used for the construction as required; and that they borrow from abroad on bonds the other \$5,000,000, Mex., at the lowest rate of interest they can secure, giving as a guarantee the net traffic bridge-receipts from vehicles, and agreeing that, if these do not pay the full interest on \$5,000,000 Mex., they will annually make good the deficiency. Until the principal and interest of these bonds be paid in full, the bankers who advance the money thereon would collect and handle the tolls from vehicular traffic.

"As for the \$10,000,000, Mex., that the Government would subscribe, that amount might be raised by the sale abroad of Government bonds guaranteed by the receipts of the unified railroads between Peiping and Canton; for that combination would undoubtedly pay a very large net revenue, and some of it could well be spared to secure a through, uninterrupted line of railroad between Canton and Peiping and facile inter-communication at all times for the inhabitants of the cities of Hankow, Hanyang, and Wuchang."

It is highly probable that, before my present sojourn in China is ended, other similar projects will arise that will necessitate the employment of foreign capital.

IV.—Logical Construction-Sequence in China's Development

When indicating in various parts of the preceding memoirs the work that should be done in different engineering lines in order to improve existing conditions and to prepare for much desired expansion and development, I did not pay sufficient attention to the order of importance of the undertakings suggested; hence a special memoir on the subject is now in order before I proceed further in the writing of this series of papers.

Some projects are of more immediate importance than others, and those should be the first to receive attention, especially in view of the fact that the available funds are so woefully limited. If a multitude of projects were started simultaneously with very little money on hand or in immediate prospect, and if that little were portioned out among them all, the result would be that a start would be made on each one; then, all of a sudden, a halt would have to be called on all of them, when practically nothing at all had been accomplished.

This question of the division or non-division of funds is a rather delicate matter; for there are several Ministries of the Government that are interested in reconstruction and new construction projects, and it is quite natural that each Ministry will tend to hold the view that its jobs are the most important of all. For this reason the allotment of available funds should be determined by the Cabinet in full session before any great amount of such funds is expended; and the Cabinet members should be so broad-gauged as to be willing to set aside temporarily their own projects in favor of those of more immediate necessity. It would be an utterly suicidal policy were the Cabinet to compromise any dispute over the disposition of available funds by dividing the money among the disputants. Nothing at the present time could be worse than this for the welfare of the Republic. Not only would it shortly bring construction to a standstill, as just indicated, but it would also discredit the National Government abroad to such an extent as to postpone for quite a while the procurement by China of foreign loans. On this matter I know whereof I speak, as I have been of late years and still am in close touch with American financiers—and money for large loans these days must come mainly from the U.S.A.

It is my opinion that the logical sequence of needed constructions is as follows:

- A. Railways
- B. Highways
- C. River Conservancy and Flood Prevention
- D. Harbor Works and Port Developments
- E. Municipal Improvements and Sanitation

Whilst these constructions are underway, industrial developments will be inaugurated with private capital and will be materialized without any financial aid from the Government. But before the Chinese can promote native industries, or exploit their mineral resources on a large scale, or increase materially their domestic and foreign trade, they must provide adequate means for communication and transport. For this reason it is obligatory to build with the least practicable delay a system of railways and highways along the lines I indicated in Memoir No. 2. These certainly are the prime essentials to China's development, and they outrank in importance the lines of construction named in Items C, D, and E of the above list.

Preceding the actual construction of new railroads, however, there should come the reconstruction of those already in existence; for some of them are in such bad order that it is perilous to operate over them. But, in order to save time, the surveys, cost estimates, plans, and specifications for the most needed new railways lines could proceed whilst the existing lines are being strengthened or reconstructed.

In my opinion, the most pressing work in China to-day is the rehabilitation of the Han-Ping Railway, so that it will be safe to run trains over it at full speed, for it is the main railway artery of the country; and before anarchy set in, about the end of 1921, the amount of traffic over it was large and its net earnings were great. If it could soon be put into satisfactory operation, its surplus income would help materially in enabling the National Government to carry on its elaborate construction policy.

The building of the new Yellow River bridge for the Han-Ping Railway is also a pressing piece of work; because the old bridge is utterly weak in the superstructure and unreliable in the substructure. I am losing no time in preparing the studies, plans, and specifications for all of these bridges and in reporting in detail concerning the condition of the entire line and the cost of the work that will have to be done in order to make it safe for the passage of trains. Preparatory to reconstructing some of the old bridges and replacing others, there is to be built at Hankow a bridge shop having a capacity of ten thousand tons of output annually; and in it the new bridge superstructures required will be manufactured at a pound price far lower than any that would be charged by bridge manufacturers abroad.

Next in importance to the reconstruction of this railway line come the highways that will feed it. These should be started on both sides of the line as soon as there is money available. It should not be forgotten that highway construction is very cheap in China, as compared with railway construction, because the materials required for everything except the bridges are obtainable in this country, which is not the case in railway building.

Next in importance comes the construction of the yet unbuilt portion of the railway that is to join Canton and Wuchang. Already we have started on the location surveys; and a small portion of the line that has been finally located is now being graded. By the time this railroad is finished there should be a number of miles of highway feeders constructed on each side of the line.

The building of a combined railway and highway bridge over the Han and another over the Yangtze from Hankow to Hanyang and Wuchang should be started as soon as plans, specifications, and final detailed estimates of cost have been prepared, and when some satisfactory method of financing the project is consummated. Work on the financial scheme is to be inaugurated within a month; and just as soon as feasible after the subsidence of the summer flood, borings to locate the bedrock or other foundation material for the piers of both bridges will be put down.

With the completion of this structure there will be an uninterrupted rail connection between Canton, Peking, Siberia, and all of the continental European countries. As for other arterial-lines of railway, the Government is now starting to make reconnaissances for two of them, each exceeding one thousand miles in length; and it is hoped that ere long construction will be started on one of them.

If it be on the tapis for the Government to install an aviation system to carry mail, express, and occasionally a few passengers, this enterprise should be started without a day's unnecessary delay; for now is the time when such a system is most needed. After the railways and highways are completed, the pressing need for aerial transportation will cease, for it would become a luxury rather than a necessity; hence it would be in the line of true economy to order the planes immediately, and to begin at once on the construction of hangars and landing fields.

V.—Economics of Technical Education for China

Shortly after my arrival in this country, by the request of His Excellency Sun Fo, Minister of Railways, I added to the official duties covered in my contract with the Government advisory services on the remodeling of the civil engineering course in Nanyang University, and incidentally on technical education in general for China. This additional work I am undertaking gladly; for I have been deeply interested in engineering education for a full half century. During six of my fifty-three years of professional service I taught engineering, two as assistant professor at Rensselaer, my *alma mater*, and four in charge of the Civil Engineering Department of the Imperial University at Tokyo, Japan. Moreover, I am a charter member of the Society for the Promotion of Engineering Education, have taken a fairly active part in its activities, and have served as chairman on one of its most important committees. Again, for more than four decades I have been writing and lecturing from time to time on educational subjects, as can be seen by looking over Mr. Frank W. Skinner's book, entitled "Memoirs and Addresses of Two Decades," that was issued last November.

I am stating these facts candidly and without any sense of false modesty, in order to make evident to my readers the reasons why I (a practicing engineer and no longer a teacher) deem myself qualified to pass upon questions relating to engineering education.

When asked laterly what kind of an engineering curriculum I would recommend for Chinese institutions of learning, I have replied that I favor one fundamentally different from what I have been advocating during several decades for American schools. While it is true that American engineering education is certainly inferior to none in the world, it is still far from being perfect, as I have been preaching since 1886, and as Prof. Charles Scott of Yale, a prominent American educator, has lately proved in a report to the deans and administrative officers of 164 institutions of the United States and Canada, based upon an elaborate, three-year, fact-finding investigation that cost in the making more than \$200,000 gold.

For more than forty years I have been claiming, both orally and in print, that a proper course in civil engineering cannot be given in four years, and hardly even in five and that, consequently, all first-class engineering courses should cover five years. Many prominent technical educators agree with me in this view, although the experiment of making such an extension has been tried and found a failure. Young America, who, like his forebears, is in a chronic state of hurry, wants to complete his technical education in four years and get into practice. There is only one way to force him to take the longer course, which his development sadly needs, *viz.*, for the directors of the leading technical schools of the United States and Canada to combine and agree that they will give in their institutions no technical degree whatsoever for less than five years of undergraduate work. Eventually they may take such a step in the best interests of technical education; but it will probably require considerable time for a majority of them to muster sufficient courage for such drastic action.

Recognizing the futility of trying any more for a while to lengthen the duration of engineering courses, and that most technical graduates are rather narrow in their views and incapable of expressing them in good English, I have been suggesting that our technical schools give broader education, by including in their curricula more courses in modern "humanities," and that they concentrate on "English Language" and "Economics." As most engineering curricula are already crowded to the limit with studies, leaving apparently no time for any additional work, I have been advocating the omission of most of the so-called "practical" instruction, leaving in only enough of it to illustrate how the theory the students learn is, or should be, applied to practice.

For China, however, I counsel exactly the reverse policy, *viz.*, cutting out from the course all the "frills and furbelows" and giving instead in both office and field as much instruction as possible in the practice of engineering under the direct supervision of competent, experienced, capable, practical, and earnest teachers. These teachers should function mainly as consulting engineers for their classes, directing their reading and answering any questions the students may propound. Occasionally it may be advisable to give a "quiz," so as to ascertain how well they comprehend the subject matter of their reading.

Courses of this kind should be given in all lines of surveying, and in railroads, highways, bridges, water supply, sanitary engineering, rivers, harbors, canals, general hydraulics, steel buildings, reinforced-concrete constructions, hydro-electric power, irrigation, aerial transportation, and kindred subjects. I recognize that it will take time for any one student to cover all of this ground thoroughly; but he could, if necessary, concentrate on a few subjects and study the others less intensely. However, a student of the right caliber, energy, and ambition would probably not be willing to neglect any course, but would drive himself to the limit, in order to assimilate as much practical knowledge as possible.

The success of this type of technical instruction depends greatly upon the ability and ambition of the students, but still more upon the enthusiasm, teaching capacity, experience, and willingness to work of the instructors. If these be of the ideal kind, the amount of knowledge that the young men can acquire and retain is truly surprising.

A large supply of textbooks and books of reference for the school library is essential, because the students ought not to be compelled to purchase an abnormally large amount of technical literature; nevertheless they should be encouraged, and even urged, to buy and keep for future reference as many of such books as they can afford; and the institution should make arrangements for securing them at the lowest attainable price.

This drastically practical course may not be the best one for individual engineers, in that a study of the humanities and languages is good for young Chinese as well as for young Americans; but it is decidedly the best one when the interests of the Chinese Republic are considered. After the great rush of work on construction is past (say a decade hence) the character of the curricula of the Chinese technical schools can be gradually changed so as to follow somewhat the lines of those of the leading American institutions.

There is to-day a serious fundamental problem of demand and supply confronting the National Government. To explain it I can do no better than to quote the following portion of my Report No. 8 to His Excellency Sun Fo, Minister of Railways, dated February 15, 1929:

"During the three weeks that have elapsed since my arrival at Shanghai there has gradually been brought to my notice a condition of a very serious nature that is of vital interest to your Ministry, in that, unless it be corrected without delay, you will not be able to proceed with the work you are now doing for the development of China. The country's first and fundamental need is for railways that can be operated effectively and economically; and these can be secured only through technically trained men, who are needed for reconnaissance, preliminary, location, construction, reconstruction, maintenance, and operation.

"There is only a very limited number of trained engineers in China; and most of these are occupied on tasks that they either cannot or will not relinquish for railroad service. Young technical men, of thirty or thereabouts, are greatly needed to-day by your Ministry as assistant engineers, and some older ones for chiefs of parties. As well as I can learn, the demand cannot be filled; hence it is essential that we look ahead and provide not only for present needs but also for those of the immediate future.

"A goodly number of more or less effectively trained railway engineers must be obtained with the least possible delay; and this report is made to offer to Your Excellency a suggestion as to how a supply of them can be secured.

"If, in the several engineering schools of China, especially those under the control of your Ministry, the remaining months of the present scholastic year, and possibly two or three of the succeeding months, were devoted to the intensive training of the senior classes solely on strictly practical railroad subjects by lectures, reading of books, and field work the members thereof could be turned over to your Ministry in shape to serve as assistant engineers, but not to take charge of surveys or any other important work in-

dependently. By offering these students fairly large salaries at the outset, with promise of advancement after some more practical experience has been obtained, you could probably induce many of them to take the special course and serve their country in its dire need for technical assistance.

"In the schools controlled by your Ministry you could insist that all the members of the senior class in civil engineering take this intensive course by refusing to grant them degrees unless they do so. There would be nothing wrong or unfair in adopting this expedient; because, when a nation enters a war, she immediately takes the men from the senior classes, of her military and naval schools and puts

them into service. In some cases the demands of peace are just as exigent as those of war, and this is one of those cases.

"You may have some difficulty in finding in China men capable of acting as professors for these senior classes and of giving them the practical training they need; but, fortunately, not many instructors are required. By providing each professor with a small staff of young teachers for both office and field, the desired result could be accomplished."

His Excellency has approved the preceding suggestion of mine, and is now arranging to act upon it. I am hoping that it will soon be put into effect and that it will accomplish the purpose desired.

Sino-Japanese Settlement of the Nanking and Hankow Incidents

FOR the sake of completing the documentation of the historical relations between China and Japan, we publish herewith the exchange of notes relating to the Hankow and Nanking Incidents, which were outstanding causes of conflict between the two countries. The notes follow:

Dr. Wang to Mr. Yoshizawa

Excellency:

With reference to the incident which occurred at Hankow on April 3, 1927, I have the honor, in the name of the National Government deeply regret the incident which, as investigation shown, took place through the instigation of the Communists. They are therefore ready to indemnify, in accordance with principles of international law and to an extent reasonable and necessary, all damages on person and property which were incurred by the members of the Japanese Consulate, sailors of the Japanese Navy and the resident Japanese in general. For that purpose it is desired that a Sino-Japanese Commission of Investigation should be formed with the object of investigating on the spot the damages incurred by the Japanese and of determining the exact amount of indemnity. It is further desired that such Chinese citizens as were injured at the first stage of the incident should be properly taken care of, so that the whole affair may be amicably settled.

Accept, etc.,

May 2, 1929.

Mr. Yoshizawa to Dr. Wang.

Monsieur le Ministre:

I have the honor to acknowledge the receipt of Your Excellency's note of to-day's date concerning the incident which occurred at Hankow on April 3, 1927.

I beg to express agreement to Your Excellency's proposal that for purposes of indemnification a Commission of Investigation consisting of Japanese and Chinese members be formed with the object of examining and determining all damages on person and property incurred by Japanese nationals.

I may be permitted to add that in case the National Government fulfill their obligations above mentioned in the shortest possible period of time, all questions arising from the Hankow incident will be regarded as finally settled.

Accept, etc.,

May 2, 1929.

Dr. Wang to Mr. Yoshizawa.

Excellency:

I have the honor to declare to Your Excellency that the National Government of China, desirous of advancing the traditional friendship between the Chinese and Japanese peoples, are prepared to settle as soon as possible the incident which occurred at Nanking on March 24, 1927.

Accordingly, in the name of the National Government I beg in all sincerity to express to Your Excellency's Government a sense of the deepest regret for the insult and indignities as well as injuries and damages on person and property incurred through the said incident by the Japanese Consulate, Japanese officials and other Japanese nationals. While it has been fully proved as a result of investigation that the incident occurred through the instigation of the Communists before the National Government had established their seat of government at Nanking, the National Government are ready to take the responsibility.

The National Government, in pursuance of the policy they entertain, have on several occasions instructed the military and civil authorities to afford continual and effective protection to the lives and property of Japanese nationals in China, and now that the Communists and their pernicious influence which undermines Sino-Japanese friendship have been removed it is hoped that in future the protection of foreign nationals will be greatly facilitated. I am therefore in a position to declare hereby that the National

Government will take it upon themselves to see that the lives and property of Japanese nationals and their lawful pursuits are no more subjected to similar outrage or instigation.

I beg further to inform Your Excellency that the troops who at the instigation of the Communists participated in this unfortunate incident have already been disbanded and that the National Government have taken other effective measures including the punishment of soldiers and other persons involved in the affair.

The National Government are further prepared promptly to indemnify the damages on person and property inflicted upon the Japanese Consulate, Japanese officials and other Japanese nationals, and for that purpose they propose that a Sino-Japanese Commission of Investigation be formed with the object of ascertaining the injuries and damages incurred by Japanese nationals at the hands of the Chinese and of the amount of indemnity to be allotted in individual cases.

Accept, etc.,

May 2, 1929.

Mr. Yoshizawa to Dr. Wang.

Monsieur le Ministre:

I have the honor to acknowledge the receipt of Your Excellency's note of to-day's date in which you make the following statement:

"I have the honor to declare to Your Excellency that the National Government of China, desirous of advancing the traditional friendship between the Chinese and Japanese peoples, are prepared to settle as soon as possible the incident which occurred at Nanking on March 24, 1927.

"Accordingly, in the name of the National Government I beg in all sincerity to express to Your Excellency's Government a sense of deepest regret for the insult and indignities as well as injuries and damages on person and property incurred through the said incident by the Japanese Consulate, Japanese officials and other Japanese nationals. While it has been fully proved as a result of investigation that the incident occurred through the instigation of the Communists before the National Government had established their seat of government at Nanking, the National Government are ready to take the responsibility.

"The National Government, in pursuance of the policy they entertain, have on several occasions instructed the military and civil authorities to afford continual and effective protection to the lives and property of Japanese nationals in China, and now that the Communists and their pernicious influence which undermines Sino-Japanese friendship have been removed it is hoped that in future the protection of foreign nationals will be greatly facilitated. I am therefore in a position to declare hereby that the National Government will take it upon themselves to see that the lives and property of Japanese nationals and their lawful pursuits are no more subjected to similar outrage or instigation.

"I beg further to inform Your Excellency that the troops who at the instigation of the Communists participated in this unfortunate incident have already been disbanded and that the National Government have taken other effective measures including the punishment of soldiers and other persons involved in the affair.

"The National Government are further prepared promptly to indemnify the damages on person and property inflicted upon the Japanese Consulate, Japanese officials and other Japanese nationals, and for that purpose they propose that a Sino-Japanese Commission of Investigation be formed with the object of ascertaining the injuries and damages incurred by Japanese nationals at the hands of the Chinese and of the amount of indemnity to be allotted in individual cases."

Accordingly, I beg to express agreement to the proposal made in the said note and to add that in case the National Government fully discharge their obligations above mentioned in the shortest possible period of time, all questions arising from the Nanking incident will be regarded as finally settled.

Accept, etc.,

May 2, 1929.

Machinery and Engineering in China

The Following Interesting Article is taken from "Commercial and Economic Situation in China" by H. H. Fox, C.M.G.

THE following notes on the machinery trade in China, kindly placed at my disposal by a British firm, cover the year ending June 30, 1928:—

The machinery trade in common with all others received a serious set-back in the early part of 1927, but during the last six months considerable improvement has been shown in spite of generally disturbed conditions, a number of orders for industrial plant have been placed and there are at present numerous enquiries in the market.

Railway.—With the exception of Manchuria, where there has been considerable development, little or no business has been done with the railways, though in the latter half of 1927 the Peking-Mukden Railway resumed buying on a large scale. This has naturally fallen off recently.

Textile Machinery.—There has been little new development in this line though many Shanghai mills have been adding additional machines to their existing plant. Enquiries have recently been received for new plant but the only big order placed during the past year was a 250-loom plant for a Chinese mill at Tongshan (see list of contracts below).

Flour Mills.—There has been considerable business in flour milling machinery recently and it is understood that orders for seven or eight mills of various sizes have been placed during the past year. These orders were divided fairly evenly between British, American and German manufacturers, and at least two fair sized mills, one of 2,000 barrels capacity, were sold by a British firm.

Gas and Oil Engines.—Until recently gas engines and gas producer plants were favored by Chinese buyers in preference to crude oil engines, as the anthracite coal used with the former is procurable in China whereas oil fuel has to be imported. Recently, however, owing to the closing down of Chinese coal mines, oil engines have been gaining in favor and owing to the lower cost of running are likely to retain their popularity. There is an increasing demand for oil engines of all descriptions, the majority of heavy slow speed engines being imported from Great Britain, while most of the high speed light type come from America, Scandinavia, and Germany. Small kerosene engines of from 2 to 6 h.p. are much in demand for driving small centrifugal pumps for irrigation purposes, also for use in rice hulling mills. In this line British makes seem to be unable to compete with American in the matter of price.

Electric Power Plants.—A certain number of orders have been placed for electric power plants, but British manufacturers have not on the whole been very successful. An important order for two 10,000-k.w. sets for the Chapei Electric Light Works (Chinese) was recently placed in Austria: on the other hand it is understood that the machinery required for a very considerable extension of the Shanghai Municipal Council Electric power plant has been purchased in the United Kingdom.

A correspondent, who has had considerable experience of the merchant's side of the machinery and engineering trade in China, sends me the following notes which will, I trust, be of interest to British manufacturers, though they may not perhaps always agree with his conclusions:—

"Manufacturers as a rule bind themselves by very stringent terms of payment by cash or drafts against bankers' confirmed credits, while the Chinese seek to obtain through competition more elastic terms; if the contract is not satisfactorily carried out payments are held up and the merchant has to rectify matters or compromise in some way to liquidate the difference.

"Many Chinese adopt the attitude, especially in the case of big engineering contracts, of paying in instalments, say one-third on signing the contract, one-third on shipment, and one-third on receipt of goods or erection of plant—in some cases they will insist on actually operating the machinery before making the final payment. As bankers' guarantees against the last payment were not usually forthcoming, the merchant is often obliged to take considerable risks which are not always shared by the manufacturer.

"The Chinese client usually has a number of offers from different countries to choose from and being unable himself to decide whose recommendations of the superior quality of their goods is to be believed, proceeds to eliminate the offers on various pretexts and finally selects two or three, either on the advice of friends or because the manufacturer has a well-known name. He will then start playing off one offer against another—not infrequently disclosing information contained in one candidate's offer to a rival in order to secure a reduction in price—firstly as regards price, then delivery and finally as regards terms of payment, with the result that by the time he has finished with the last remaining offer the Chinese buyer secures his machinery at an extremely low price, promise of quick delivery, and from his point of view, very advantageous terms of payment. Another method is to invite offers for plant against cash or other attractive terms of payment. Having received these offers and the usual bargaining on price having been attended to, the foreign merchant will suddenly be confronted with a change to long term credit terms which will be insisted upon at foreign bankers' interest rates. This gives the Chinese buyer a cut price to work upon and deprives the merchant of the profit he would have allowed for to cover long credit risks.

"British manufacturers hold as a rule that their machinery being of first-class quality they are entitled to higher prices and that satisfactory results will bring further business after clients have suffered from the consequences of purchasing inferior material. Unfortunately this question of quality is one which it is extremely difficult to take up with the Chinese. They can usually cover themselves when buying at the lowest offer by insisting upon a suitable guarantee against unsatisfactory operation of the plant which the merchant cannot withhold if he wishes to secure the business. It is true that certain classes of machinery bear such a high reputation that sales at higher prices are more easily effected but this is usually only after long years of pioneer work or where a manufacturer has a practical monopoly, say of a particular class of boiler.

"Shipment and delivery have an important bearing on sales. The Chinese are usually in a hurry to see the goods they buy, and the merchant is naturally anxious to turn over his business in as short a time as possible—so a month or two months difference in date of shipment often turns the scales in favor of the quicker delivery even at a higher price.

"It is doubtful if manufacturers always realize the heavy overhead expenses that have to be carried by any firm who establishes an efficient engineering sales organization prepared to deal with the large number of enquiries which so often never develop into real business and yet cannot be neglected. Manufacturers give extra work by interleaving their catalogues and price lists with modifications in prices and cancellations and it would simplify matters for the merchant very much if some system of standard quotations could be adopted which would enable enquiries to be answered promptly with a minimum amount of checking and cross-checking.

"Merchants who handle engineering sales organizations depend largely on the co-operation of their Chinese staff, salesmen, representatives and compradores. Negotiations which often last weeks and even months can only be satisfactorily concluded after careful studied team work between the foreign and Chinese staff.

"If it were possible in China to do business, as it sometimes is done with Chinese railways, for cash or satisfactorily confirmed bankers' credits, the outlook would be entirely changed and we could expect the best manufacturers with the highest reputations to be attracted to this market. As it is the difficulties of negotiating large engineering contracts, of seeing that the order is satisfactorily executed, of collecting payment and of securing a reasonable profit after all overheads have been accounted for, are probably greater to-day in China than in any other market in the world."

The following notes on some typical contracts and orders of machinery and industrial plant placed with British and foreign

firms during the past year, kindly furnished by His Majesty's Consuls in various parts of China, may be of interest to British manufacturers:—

Harbin. A complete electric power plant (3,000 k.w.) for the local tramway system (10 miles), with cars, etc., from Germany, but boilers, engine and pumps made in England.

A new dynamo and several electric motors for a British owned oil mill, together with a battery of six Anglo-American presses, all of British manufacture.

A 1,000 k.w. turbo-alternator with American boilers for the electric light works at Fu Chia Tien (Chinese suburb of Harbin).

An order for the extension of the Chinese Eastern Railway's automatic telephone service placed in America, the original plant having been purchased in Great Britain.

A contract placed in Czechoslovakia for the replacement of the big bridge over the Sungari River.

Many orders for motor buses, lorries and agricultural tractors, all placed in America. Also an important order given to an American firm for a tractor with trailers for hauling timber, the first of its kind in Manchuria.

In 1927 and 1928 the Chinese Eastern Railway Company and the Hu-Hai Railway purchased about 32,000 tons of rails; the yearly requirements of these two lines for, say, the next five years, will be from 10 to 15,000 tons per annum. The Chinese Eastern Railway orders went to French and German firms, but an order for 8,000 tons of Siemens-Martin steel rails for the Hu-Hai railway was secured by a United Kingdom firm in April last in competition with Belgian and German tenders.

Tenders have recently been invited for 600 freight cars of 25 tons capacity and 100 freight cars of 30 tons capacity for the Chinese Eastern Railway and Hu-Hai railway. The prices quoted in the first case were in the following order:—Belgian lowest, then French, German, American and lastly British. No offer has yet been accepted (August, 1928).

Belgian, French, German and American firms—but no British firms—recently competed for a tender of seven Decapod type locomotives for the Chinese Eastern Railway and five Mikado type for the Hu-Hai railway. The first order went to an American firm; the second has not yet been placed.

At *Mukden*, the capital of Manchuria, an order was recently placed with a French firm acting on behalf of a British manufacturer (in the face of strong American and German competition) for an automatic telephone installation of 3,500 numbers. Another British firm recently secured an order for a 5,000 k.w. extension for a Manchurian arsenal.

Amoy.—A new incandescent oil burner (British) for the Chapei inland lighthouse, 400,000 c.p. revolving dioptric second order light (French).

Two orders by the Kulangsu (Amoy) Electric Light Company for a 180 h.p. oil engine and a 120 k.w. set both placed in England.

The Amoy Telephone Company are replacing their old telephones with German apparatus purchased in Shanghai.

Tientsin. British:—A 250 loom plant complete with preparation machinery for a local Chinese cotton spinning and weaving mill; 8 B. & W. boilers for the Peking-Mukden Railway; 1 Westinghouse Brake Equipment (Peking-Mukden Railway); £18,000 worth of railway repair materials for Peking-Mukden Railway; 12 stands of flour milling machinery for a Shansi flour mill; 18 locomotives and spare parts; 1 crab hopper dredger for Hai Ho Conservancy Board; 1 electric locomotive and accessories; 3 locomotives, 40 wagons, 6 coaches and 19 miles of track for light railway to a Chinese coal mine; 1 10,000 k.w. turbo-set for the Peking Electric Light Works.

Foreign:—Eighteen stands flour mill machinery for a flour mill at Pengpu (German); 18 stands flour mill machinery for a flour mill at Tientsin (probably American); 1,500 k.w. turbo-generator for a Chinese cotton mill at Tsingtau (Swiss); 1 electric power plant (Belgian); 100 Chevrolet trucks for the Taiyuanfu arsenal (America); 100 underframes for Peking-Mukden Railway (American); 50 Chevrolet trucks for Military Headquarters, Peking (American).

Canton.—Four patrol boats for Canton Government (building in Hongkong—engines imported from Great Britain); 1 automatic telephone system of 4,000 numbers for Canton (American); 1 wireless installation 1,000 k.w. with amplifier (American); additional plant for waterworks at Canton (German); 2 Baldwin locomotives for Canton-Hankow Railway (American).

Shanghai.—Space does not permit of a list of the many and varied orders for machinery and industrial plant of all kinds placed

either in China or at home on account of Shanghai during the past year, but the following may be mentioned as typical of the steady industrial expansion of that great port—Machinery and equipment for flour mills, electric power stations, pumps, pumping, cotton mills, silk filatures, refrigerating installations, printing and paper cutting, cigarette factories, engineering and shipbuilding yards, and propelling plant such as boilers and turbines.

The following important orders have been placed during the past year:—Two 10,000 k.w. turbo-alternator sets for the Chapei Electric Light Works (Austria); 2,000 h.p. crude oil plant for French Tramways (Switzerland); 2 20,000 k.w. turbo-alternator sets for Shanghai Municipal Council Electricity Department (Great Britain).

Tsinanfu (Shantung).—An American firm have just secured a contract for an extension of the Tsinanfu Electric Light Works:—Generating plant (American) with British boilers.

Tsingtao.—A large order for mining cables for a local coal mine was recently obtained by a British firm after keen competition with foreign firms.

The Kiao Tsi Railway has placed an order for 20 steel bridges in Germany, the prices being 25 per cent. lower than those quoted by British firms.

A local motor bus company has purchased 20 Chevrolet one-ton chassis to which have been added plain covered-in bodies of local construction.

There is a good future here for commercial motor vehicles up to 1½ tons capacity, but there is keen competition on the part of American manufacturers.

The Capacity of Japanese Industry

THE following interesting data is taken from "The Textile Industry of Japan" which bases its data on a report issued by the Department of Commerce and Industry.

According to this, the recent total yearly production of the domestic factories employing over five workmen, excepting the Government-controlled factories, is Y.7,154,797,000, of which Y.4,493,212,000 is covered by the outputs of those small and medium manufacturers who employ less than 500 workmen, which figure show 62.8 per cent. of the total production. The particulars are shown below:

Kind of Industry	Total Output of Works Employing More Than Five Workmen	Total Output of Works Employing Less Than 500 Workmen	Percentage
Spinning and Weaving Industry	Y.2,872,000,000	Y.1,568,000,000	54
Metal Industry	447,000,000	283,000,000	63
Machinery and Apparatus Industry	538,000,000	239,000,000	44
Ceramic Industry	210,000,000	169,000,000	80
Chemical Industry	813,000,000	627,000,000	77
Sawing and Wood Working Industry	183,000,000	183,000,000	100
Printing and Book Binding Industry	158,000,000	139,000,000	88
Food Industry	1,249,000,000	1,038,000,000	83
Gas and Electric Industry	150,000,000	150,000,000	100
Miscellaneous	225,000,000	200,000,000	89

In addition to these, there is also the so-called household industry, the yearly production being as under:

Goods for domestic use	Y. 887,370,000
Goods for export	247,117,000
Total	Y.1,134,487,000

And the leading articles turned out by this peculiar industry are as follows:

FOR DOMESTIC USE.—Silk-cotton mixed fabrics, silk sash materials for Japanese women, tabi (or Japanese socks), umbrellas and parasols articles made with paper, furnitures and upholsteries, china and earthen wares, tiles, glass wares, lacquer wares made with Japanese paper, leathers and their finished products, wooden articles, bamboo goods, brushes and other similar goods, copper wares, straw articles, etc., etc.

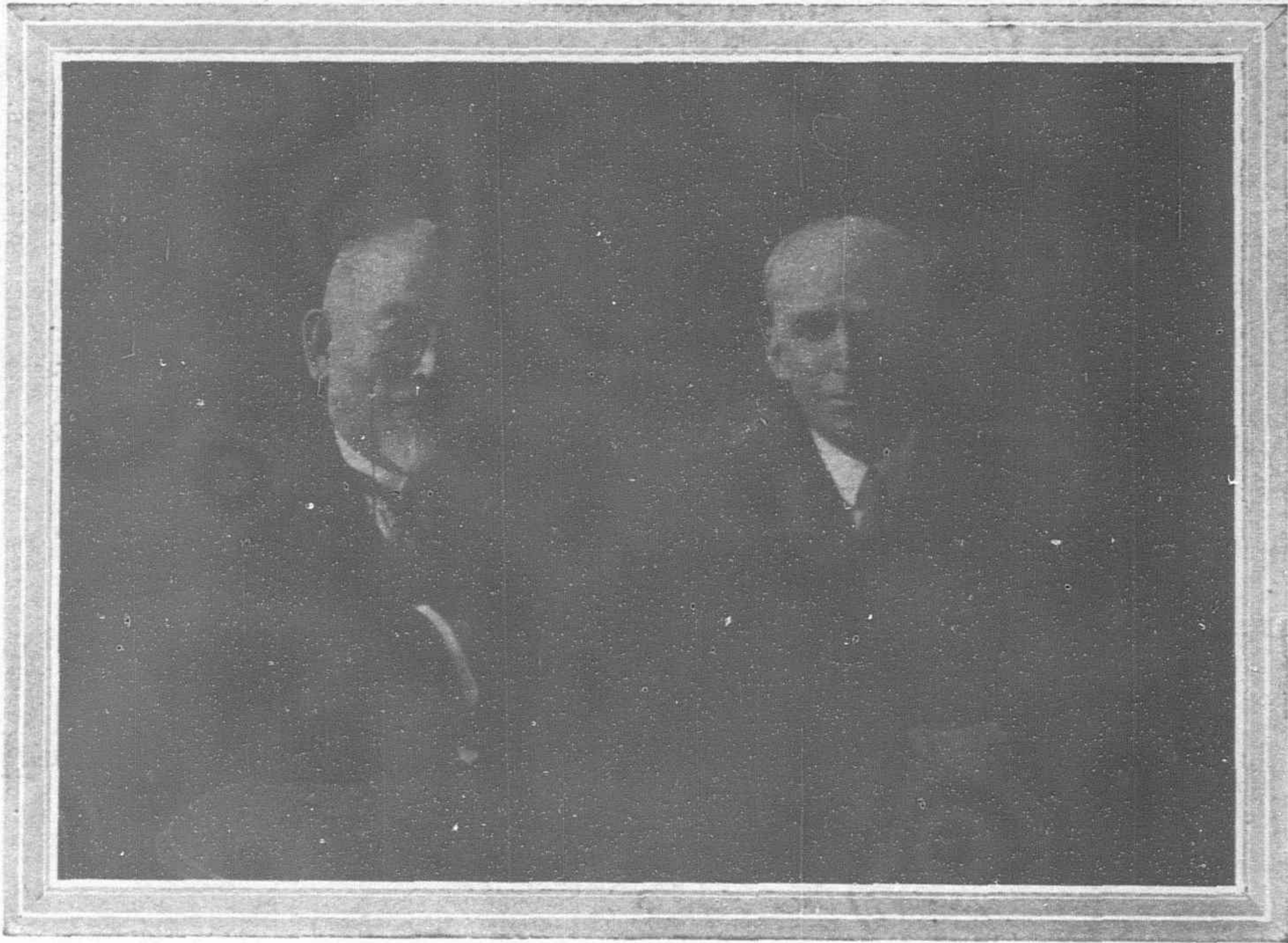
FOR EXPORT.—China and earthen wares, glass wares, enamelled iron wares, hosiery goods, silk handkerchiefs, lace yarns, cotton rugs, lampwicks, tabi, head-gears, braids, clocks and table-clocks, bicycle parts, wooden articles, umbrella and parasol, toys, buttons, metal products, etc., etc.

Shown below further details, classified by the number of factories and employees : 51,906 factories in total employing more than five workmen, involving 2,072,807 employees ; 49,331 factories employing over five workmen but under 100 persons, the total number of employees reaching 854,156 persons, 2,045 factories employing more than 100 but under 500 workmen, with a total employment of 447,964 persons ; and 530 factories employing over 500 workers, covering 770,687 employees in total. The number of factories employing under 500 workmen represents 98 per cent. of the total and that of employees thereof shows 62 per cent. of the whole employment.

The undermentioned table shows the number of factories and employees classified by the nature of the industry :

	Factories with less than 100 workmen	Factories with over 100 but under 500 workmen	Factories with over 500 workmen
Spinning and Weaving Industry :			
Number of factories	16,174	1,205	362
" " employees	324,000	255,000	482,000
Metal Industry :			
Number of factories	3,184	85	14
" " employees	49,000	21,000	42,000

Machinery and Apparatus Industry :			
Number of factories	4,164	198	79
" " employees	72,000	47,000	152,000
Ceramic Industry :			
Number of factories	2,486	76	14
" " employees	40,000	18,000	14,000
Chemical Industry :			
Number of factories	2,383	189	30
" " employees	56,000	43,000	29,000
Sasing and Wood Working Industry :			
Number of factories	3,737	38	—
" " employees	53,000	6,000	—
Printing and Book Binding Industry :			
Number of factories	2,190	66	6
" " employees	41,000	12,000	7,000
Food Industry :			
Number of factories	10,203	97	30
" " employees	136,000	22,000	31,000
Gas and Electric Industry :			
Number of factories	377	16	—
" " employees	7,000	3,000	—
Miscellaneous :			
Number of factories	4,137	75	7
" " employees	69,000	15,000	10,000



Viscount Goto and Professor Beard

VISCOUNT GOTO

THE "Far Eastern Review" joins with his many friends, in offering condolences to the family of the late Count Shimpei Goto, one of Japan's great statesmen, who accomplished so much of a constructive nature in Formosa, Manchuria and Tokyo. As Governor-General of Formosa, as President of the South Manchuria Railway and as Mayor of Tokyo, Count Goto, was always an organizer and builder. He has held every cabinet office except that of Premier and in each he accomplished much for the upbuilding of Japan. He was instrumental in bringing Professor Charles A. Beard to Japan to plan the rebuilding of Tokyo after the earthquake. His loss is mourned not only in Japan but throughout the world.

The Industrial Machinery Market of Japan

L. J. Cochrane, Industrial Machinery Division

THE Japanese industrial machinery market was operating on a firmer basis in 1928 than it was in 1927, but the depression which had prevailed still continued to a certain extent, and new buying was somewhat restricted.

In line with the trend that, with the one exception of 1924, the year after the earthquake, has been noticeable since 1921, the Japanese market for machinery declined still further during 1927, according to official statistics. While continued industrial development and the increasing domestic production of the smaller and simpler kinds of machinery may have contributed to this decline in imports, the main reason for the general business depression that characterized the entire year was the monetary panic, which rose to a climax in March and April. This money shortage considerably limited purchasing power, causing a general retrenchment with a resulting decrease not only in machinery imports but in purchases of foreign goods as a whole.

Imports of industrial machinery to Japan during 1927 declined by Y.5,645,000, or 11 per cent, as compared with 1926. (The yen during 1927 was valued at \$0.4741 and during 1926 at \$0.4712.) This loss was taken largely by Great Britain and the United States, whose trade with Japan in the industrial machinery line fell off by 35 per cent. and 14 per cent. respectively, under 1926. German business, on the other hand, showed a sharp increase, rising by Y.4,689,000, or 63 per cent, over the previous year, which gain is accounted for partly by the cheaper German prices which better fitted the lower Japanese purchasing power. This raised Germany to second place among the principal suppliers, supplanting Great Britain, although the United States still maintained the lead. Germany's gains were made mostly in steam boilers, fuel economizers, steam turbines, pumps, looms, knitting machinery, pneumatic tools, metal and woodworking machinery, and spinning machinery.

Great Britain showed the greatest loss of trade during 1927 as compared with 1926, its business falling off by Y.5,548,000. Declines in British sales were general all along the line, but were particularly noticeable for steam boilers, fuel economizers, steam turbines and engines, cranes, blowers, hydraulic presses, pneumatic tools, tissue-finishing machines, and paper machinery. In paper machinery no imports from Great Britain are given in the Japanese statistics for 1927, as against Y.642,000 in 1926.

Imports of industrial machinery from the United States to Japan during 1927 fell by 14 per cent. under the preceding year, but, since total imports declined by 11 per cent, it is evident that this decrease has not been occasioned by the throwing of much business to competitors. Principal declines occurred for steam and water turbines, cranes, air compressors, pneumatic tools, tissue-finishing machinery, and paper machinery; but, on the other hand, considerable increases were noticeable for steam boilers, fuel economizers, steam engines, gas and petroleum engines, pumps, hydraulic presses, metal and wood working machinery, and knitting machinery. Sales of gas and petroleum engines, the largest single item in imports from the United States, increased by Y.741,000 over 1926, while metal and wood working machinery, the second important item, showed a gain of Y.753,000.

Comparison of Imports

The following table gives imports of industrial machinery into Japan during 1927 as compared with 1926:

Imports of industrial machinery into Japan—1926 and 1927*

[In thousands of yen]

Classes of machinery	United States		Germany		Great Britain		Total, including other countries	
	1926	1927	1926	1927	1926	1927	1926	1927
Steam boilers†	500	611	101	201	3,583	1,421	4,875	2,818
Fuel economizers	2	43	5	12	781	315	860	466
Steam turbines	1,629	773	77	130	279	46	2,561	1,242
Steam engines	1	16	7	1	22	2	31	20
Gas and petroleum engines‡	2,980	3,721	331	477	554	386	4,398	5,091

Classes of machinery	United States		Germany		Great Britain		Total, including other countries	
Water turbines§	333	44	821	43	—	162	2,209	517
Cranes	632	19	133	72	42	5	808	97
Capstans¶	285	203	180	155	244	145	728	530
Gas compressors	1,388	1,142	79	63	101	41	1,970	1,637
Pumps	493	506	342	366	429	253	1,670	1,512
Blowers	232	240	100	55	274	27	684	413
Hydraulic presses	13	107	30	9	31	1	75	123
Pneumatic tools	609	498	12	17	66	15	708	570
Metal and woodwork- ing	1,479	2,232	738	1,974	558	427	3,042	4,986
Spinning	603	528	1,161	3,985	5,008	5,072	8,166	10,205
Looms	133	13	170	271	63	49	569	360
Tissue finishing	20	2	360	244	301	70	698	392
Knitting	153	169	31	106	9	15	210	296
Paper	75	24	148	143	642	—	990	255
Other machinery	10,127	7,771	2,620	3,802	3,021	2,008	16,940	15,017
Total	21,687	18,662	7,446	12,135	16,008	10,460	52,192	46,547

From the standpoint of relative position in the trade, the United States was easily first during 1927 for such principal items as steam turbines and engines, gas and petroleum engines, gas compressors, blowers, hydraulic presses, pneumatic tools, and knitting machinery, but, though still maintaining the leading position, was pressed by German competition in items like capstans, pumps, and metal and wood working machinery. Germany led in supplying cranes, looms, tissue-finishing machinery, and paper-manufacturing machinery, and, while ranking after the United States, oversold Great Britain in several important items, such as steam turbines, gas and petroleum engines, pumps, metal and wood working machinery, and knitting machinery. Great Britain maintained its lead for steam boilers, fuel economizers, and spinning machinery, and moved up into first place in furnishing water turbines, but for the other items its sales were exceeded by those of both Germany and the United States. Among the minor suppliers Switzerland led in the sales of water turbines and oversold both Great Britain and Germany in steam turbines, while for pumps it ranked second, its business being exceeded only by that of the United States. Sweden also figured strongly in sales of pneumatic tools, in which item it outsold both Great Britain and Germany, although it was far outdistanced by the United States.

Sales Trends of Various Classes of Machinery During 1927

Although spinning machinery is by far the largest item of industrial machinery imported into Japan, for several years imports of this item have been showing a steady decline due to increasing Japanese domestic production, to a slowing up in the expansion of the Japanese textile industry, and to an increasing tendency on the part of Japanese capitalists to establish plants in China. Sales again took an upward slant, however, in 1927, totaling Y.2,039,000 more than in 1926, owing largely, it is believed, to the increase in spindles installed in anticipation of the abolition of night work which will go into effect on July 1, 1929.

Next in importance in Japanese machinery imports come gas and petroleum engines and metal and wood working machinery, and both of these groups showed considerably larger sales than in 1926. Among the other principal items, however, increases are to be noted only for hydraulic presses and knitting machines, while declines occurred in imports of steam boilers, fuel economizers, water turbines, gas compressors, and paper machinery, not to mention less important items such as cranes, capstans, blowers, pneumatic tools, looms, and tissue-finishing machinery. Similarly unclassified machinery, which includes a wide variety of the smaller items, also fell sharply, sales during 1927 totaling nearly Y.2,000,000 less than in 1926.

*Does not include electrical machinery, locomotives, tenders, sewing machines, nor printing machinery.

†Includes parts and accessories and mechanical stokers.

‡Includes hot-air engines.

§Includes Pelton wheels.

¶Includes other winding machinery.

Automatic Convertor at Ueno Station of the Tokyo Underground Railway

THE enormous increase of the motor vehicle traffic in the last decade has resulted in great congestion in the thoroughfares of all large towns.

During the rush hours, the vehicles can only proceed at a low speed, in spite of the most efficient traffic control.

An intensified tramcar and bus service is restricted to a certain limit within the main traffic centers. The conditions are naturally even less favorable if the streets are narrow and the tracks poor. The layout and condition of the streets of Far Eastern towns cannot in general be favorably compared with those of Europe, so that it would seem all the more appropriate for these towns to have underground or elevated railways.

Thus, the Tokyo municipal authorities decided to cope with their traffic problems by building an underground railway, the first section of which was opened in January, 1928. Even though the section, which is a double track with a gauge of 1,435 mm. is only 2 km long, nevertheless the skilful technical layout of the track is such as to ensure an adequate service, which will be improved on the railway being extended.

Due regard must be paid to earthquakes. Therefore the supporting structure of the tunnels consists of steel frames that are joined together in a longitudinal direction. Taken on the whole,

the cross-section of the tunnels differs but little from that of the Berlin underground railways. The cars conform to the usual design of those employed for rapid transit railways, being equipped with two bogey-frames and three sliding doors on each side.

Current is collected from a third top-contact rail, which is fed from the sub-station in the immediate vicinity of the underground station Ueno (main line station Tokyo).

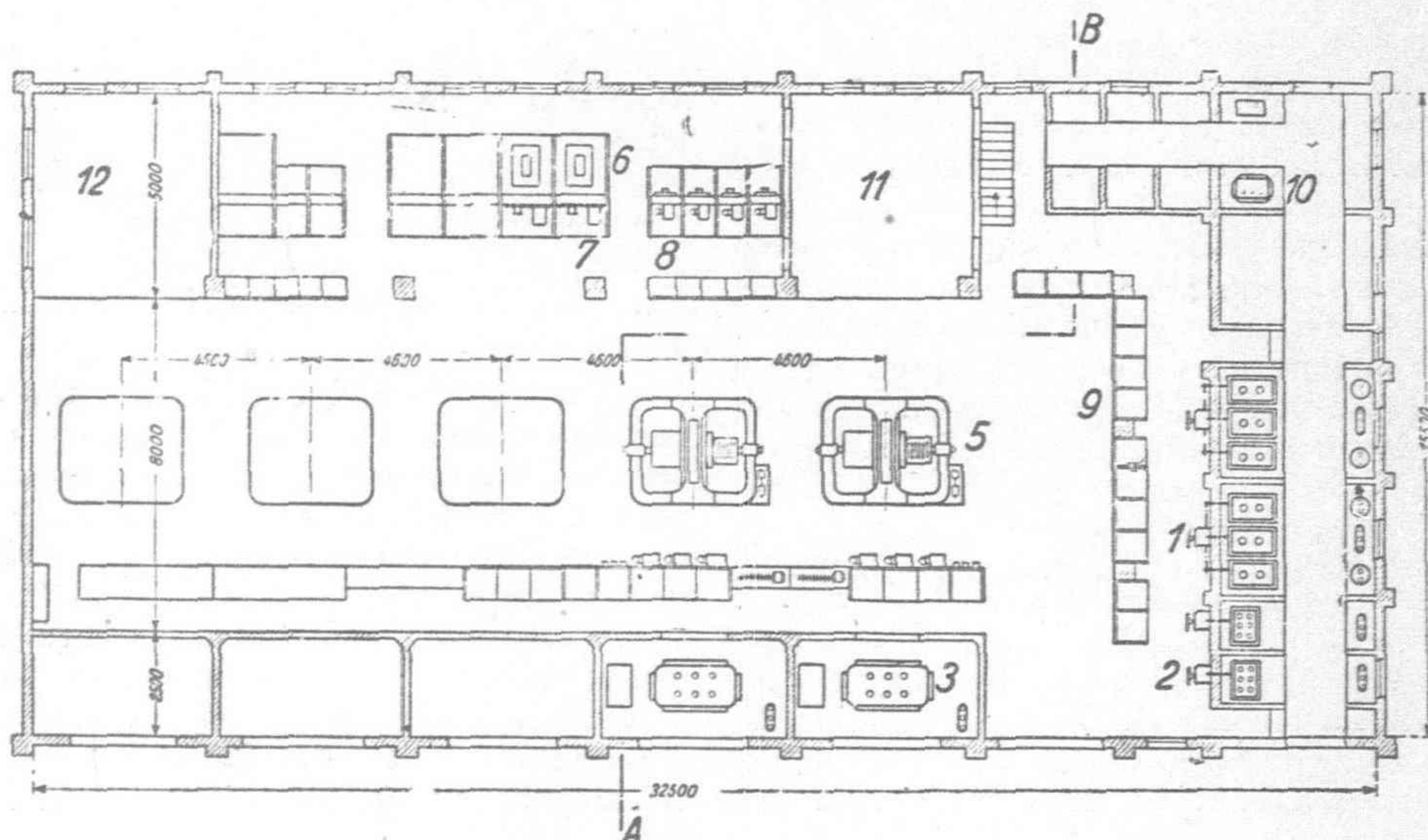


Fig. 1.—Plan of Converter Station

- | | |
|--|---|
| (1) Oil circuit breaker for incoming cable. | (7) Direct current automatic circuit breaker cells for converter. |
| (2) Oil circuit breaker for converter. | (8) Direct current line circuit breaker cells. |
| (3) Main transformer. | (9) Switchboard. |
| (5) Rotary converter. | (10) House transformer. |
| (6) Direct current high-speed circuit breaker cells for converter. | (11) Room for auxiliary drives (battery, etc.). |
| | (12) Room for service personnel. |

Sub-Station Layout of Station

The plan (Fig. 1) illustrates the ultimate layout of the station for housing five rotary converter sets. At present, two machines are installed, as these are sufficient for the prevailing service conditions. The H. T. switching plant is located on two floors at one of the gable sides of the building. The breaker drives are mounted on the front of the oil circuit-breaker cells. The control panel (Fig. 2), fitted with the necessary instruments and apparatus for controlling the sub-station, is situated in front of the

H.T. cells. The apparatus for effecting automatic starting of the converters are mounted on a separate board (starting panel, Fig. 3), whereas the direct current switching plant, consisting at present of the apparatus for four feeders and two converters, are located on the opposite side of the building. This layout enabled the equipment to be installed in a neat manner and facilitated attendance. The

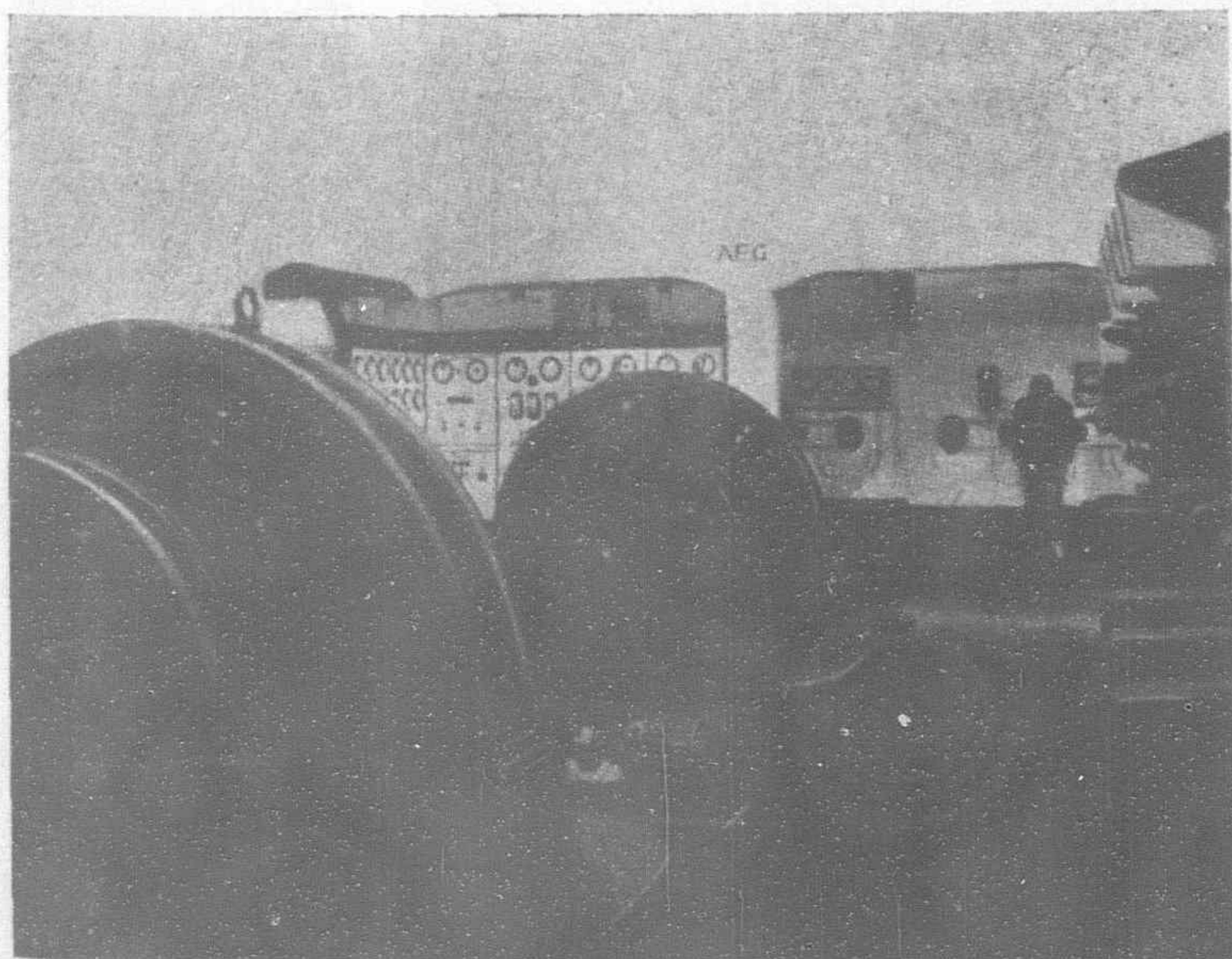


Fig. 2.—Interior View of the Station, Showing Switchboard



Fig. 3.—Interior View of the Station, Showing Starting Gear

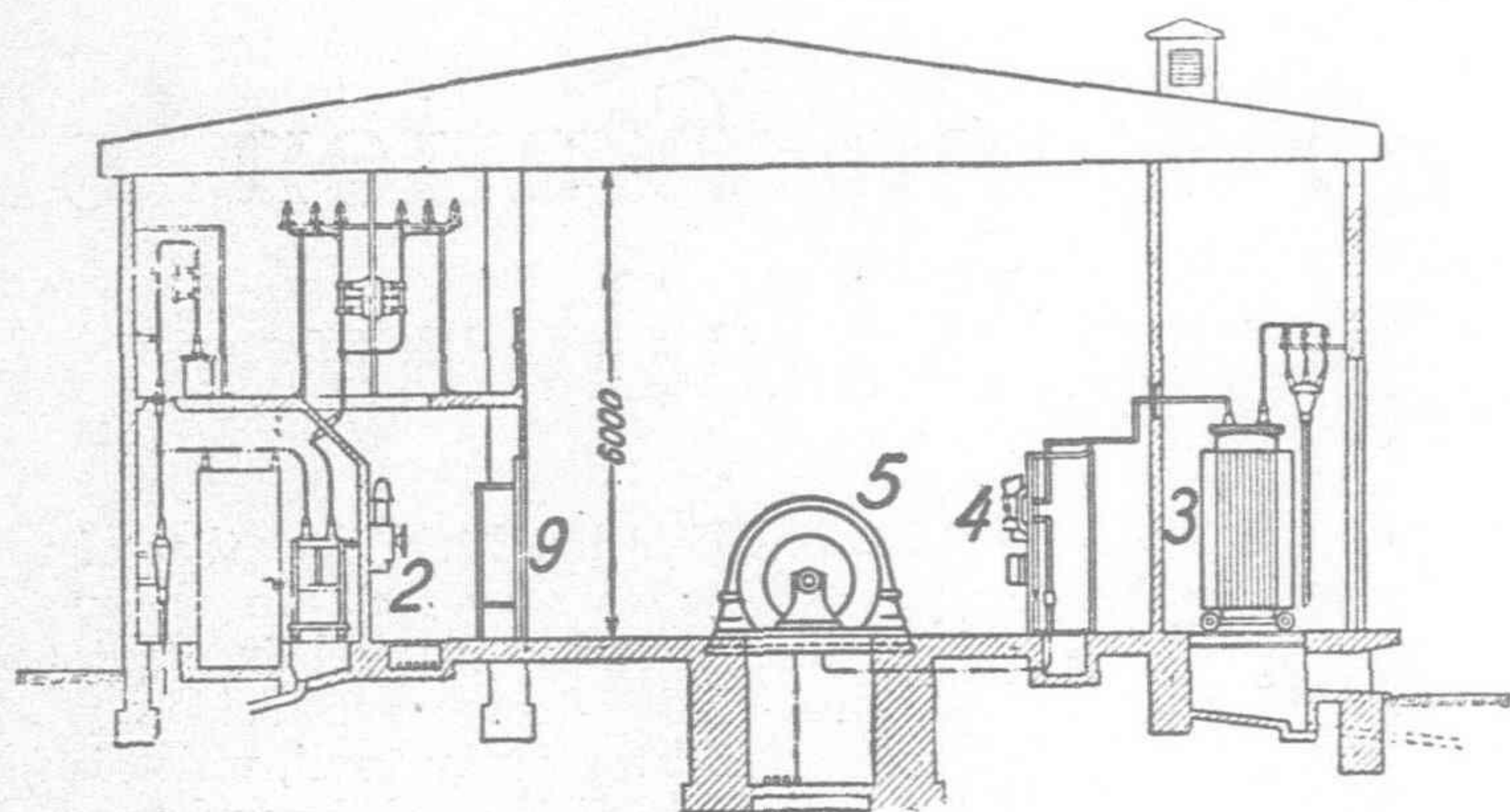


Fig. 4.—Section Through the Converter Station

- | | |
|--|-----------------------|
| (2) Oil Circuit breaker with remote control for converter, | (4) Starting gear, |
| (3) Main transformer, | (5) Rotary converter, |
| | (9) Switchboard. |

sub-station can be extended without difficulty. In order to keep the connections between transformers and starting switches as short as possible, and adapt flat copper bars, the transformers were housed in special cells, immediately behind the starters. This layout is illustrated in Fig. 4 showing a section through the station. The duplicate bus-bar system together with the isolating switches for the H.T. plant are located on the top storey, whilst the oil breakers and their drives are situated on the ground floor.

Connections

The main connections of the sub-station are shown in Fig. 5. Installed are two incoming 11 kv lines with Bendmann over-voltage protective gear, oil circuit-breakers, as also the necessary relays, measuring equipment, etc. The entire H. T. equipment is so designed that it will be suitable, without modification, for a working pressure of 22 kv, when the system is eventually extended for operating at the latter voltage. The incoming oil breakers are of the triple-tank type and are designed for a rupturing capacity of 600,000 kva.

The three-phase side of each rotary converter is protected by a triple-pole oil circuit-breaker, the direct current side by an overcurrent high-speed air-break circuit-breaker, continuously rated for 3,000 amps., which is connected to an ordinary over-current air circuit-breaker.

The gear required for asynchronous starting will be more closely discussed in the paragraph devoted to automatic control. Four railway feeders, equipped with over-current air circuit-breakers, supply the railway. No high-speed breakers have been installed in these sections, because the machines are sufficiently well protected by their own high-speed breakers. A special short-circuit testing equipment, which can be switched over to each feeder circuit, enables the sections to be tested as to their immunity from shorts, thus avoiding the closing of a feeder circuit in which a short-circuit is present.

For protecting the sub-station against over-voltages, each railway feeder is equipped with aluminium over-voltage arrestors. Each of these arrestors consists of several cells, whose number is determined by the value of the working voltage. Three cells are housed in a common case (Fig. 6). Each cell has two aluminium plates immersed in an electrolyte. The plates are covered with a film of aluminium-hydroxide, which possesses a very high resistance at the normal working voltage, whilst the ohmic value of the oxide film is considerably less at a definite limit voltage, so that the transient energy is discharged to earth. On the transient disappearing, the oxide film is immediately formed

again. The arrestor is thus immediately ready again for service, in contrast to many other types of direct current over-voltage arrestors. Another advantage is that the energy capacity of the arrestor is very great, as it functions without a series resistance.

The resistances depicted in the illustration are connected in parallel to the individual cells and ensure a uniform voltage distribution over the cells, so that the latter are always exposed to the same stresses.

The entire measurement of the sub-station output is effected on the D. C. side. Having regard to future extension, the measuring equipment is designed for a direct current load of 10,000 amps.

Rotary Convertors

Both rotary convertors (Fig. 7) are designed for a continuous output of 1,000 kw at a normal working voltage of 600 volts, 750 r.p.m., 50 cycles. They can be overloaded up to 1,500 kw for two hours and 3,000 kw for one minute. The convertors are provided with shaft oscillating gear and a commutator protective device, which, in conjunction with the high-speed circuit breakers, prevents arcing between the brushes on the occurrence of heavy short-circuits. The slip-rings are totally enclosed, so that dust from the bronze brushes cannot penetrate into the windings and thus give rise to flash-overs. The brush-dust is extracted by a fan, positioned under the slip-rings.

Since the polarity arising on the direct current side during asynchronous starting of the rotary converter is dependent on certain contingencies, it was thought expedient to install a device that presented the possibility of either altering the polarity after the converter had started up—as usual with manual control—or of impressing the correct polarity at the outset. The second solution was selected so as to cut down the starting time as far as possible. To this end, the rotary convertors were provided with two separate field windings, a normal self-excited field winding and also an auxiliary exciter winding, which only has about 10 per cent. of the ampere-turns of the main field and is fed with 110 volts. This

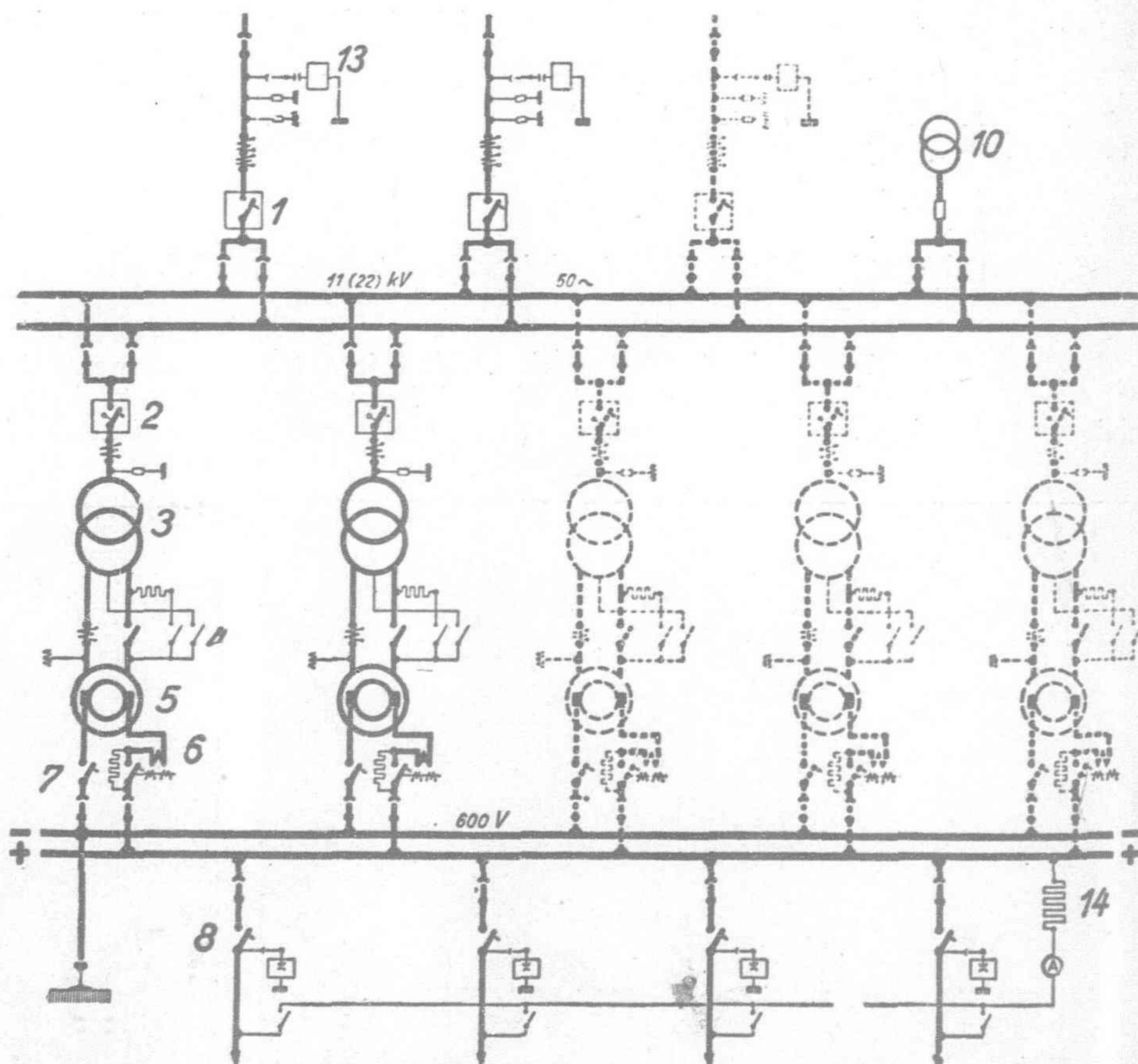


Fig. 5.—Main Diagram of Connections

- | | |
|---|---|
| (1) Oil circuit breaker for incoming cable, | (7) Direct current automatic circuit breaker, |
| (2) Oil circuit breaker for converter, | (8) Automatic line circuit breaker, |
| (3) Main transformer, | (10) House transformer, |
| (4) Starting switch, | (13) Over-voltage arrestor, |
| (5) Rotary converter, | (14) Line test resistance. |
| (6) High-speed air circuit breaker, | |

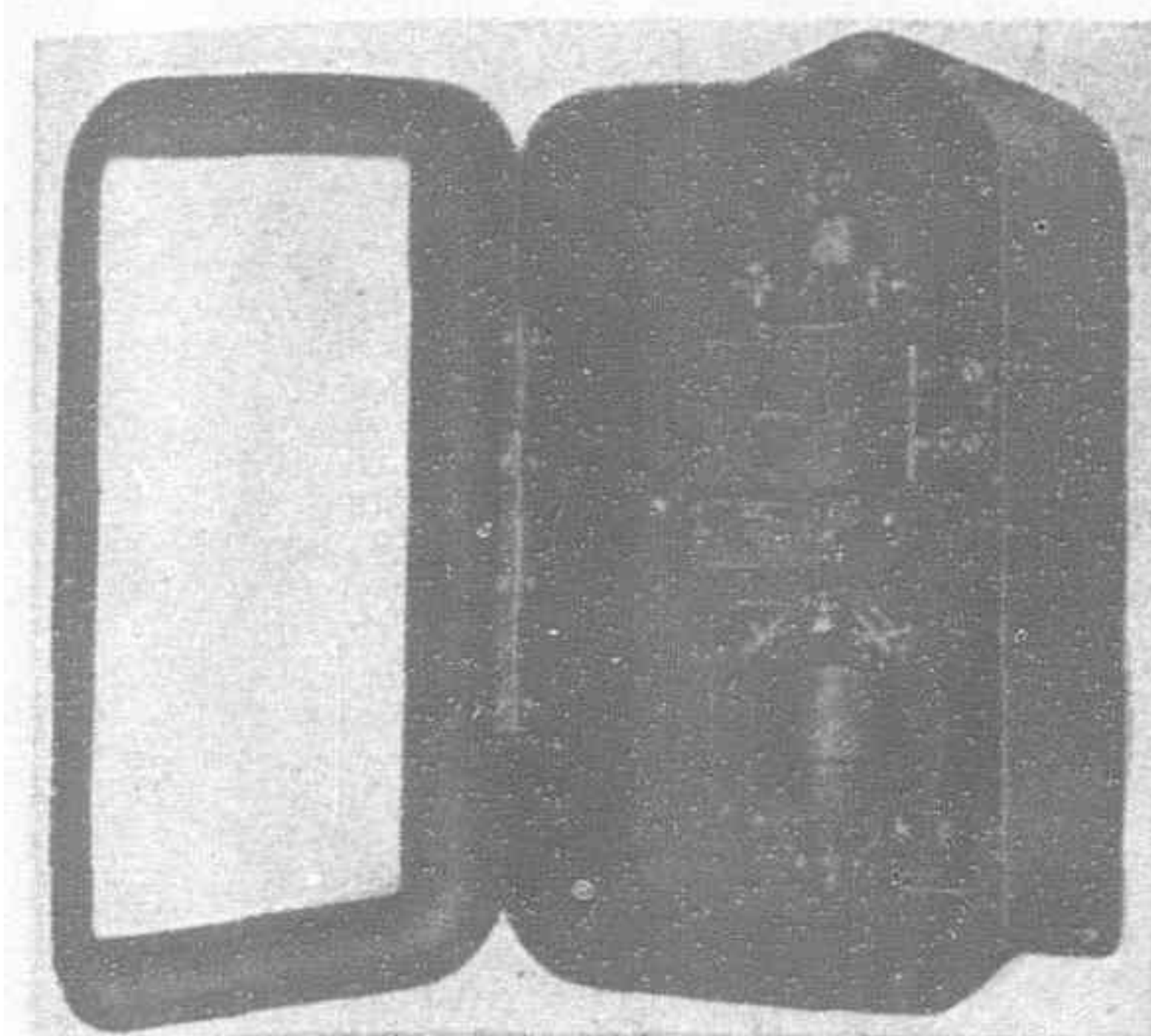


Fig. 10.—Polarized Synchronizing Relay

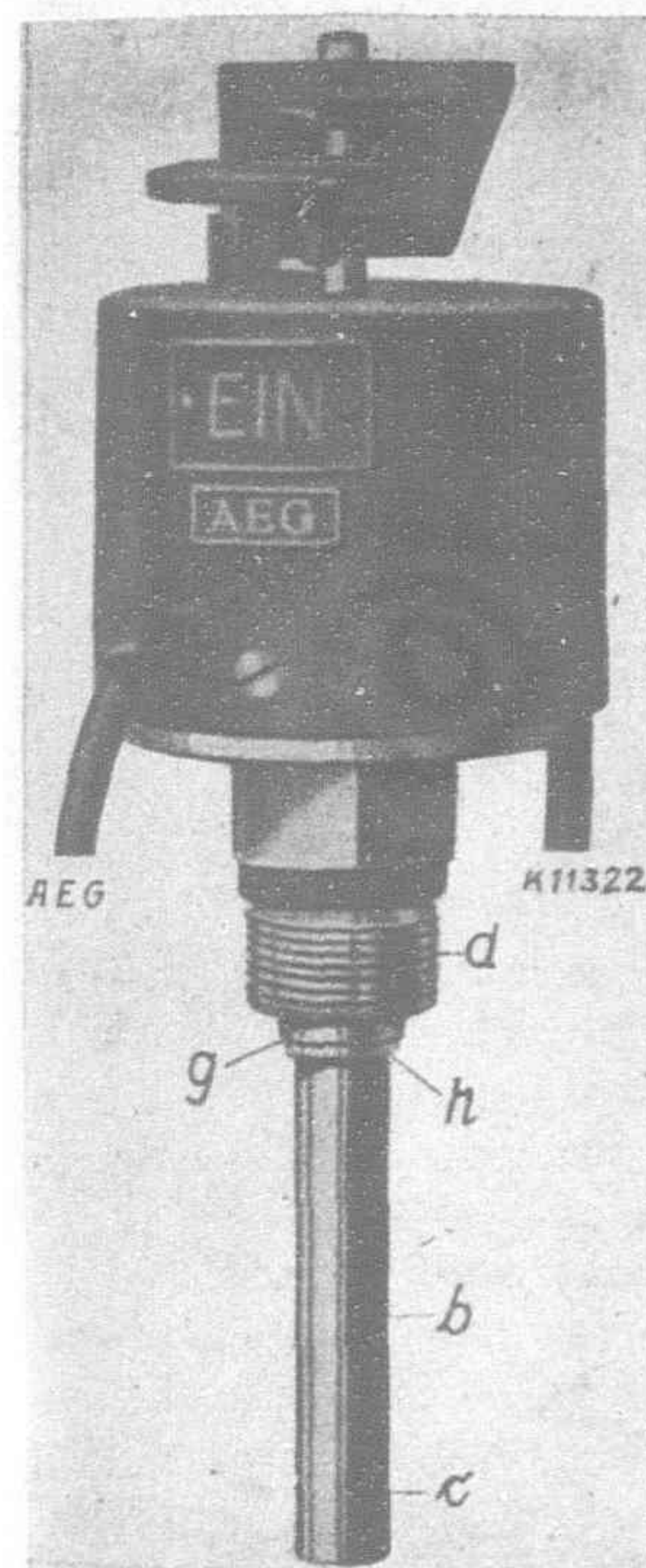


Fig. 13.—Bearing Temperature Relay for Converter

automatic plant to that portion placing the greater claims on the staff.

Starting Procedure

When starting a machine, operation is confined to actuating a push-button on the switchboard; paralleling on the direct current side is effected by a hand-operated master switch. The entire switching process, right up to closing the D.C. breaker, occupies about 60 sec., whereby, of course, all machines installed can be simultaneously attended by one switchboard attendant.

Starting up of a machine is represented from left to right in the switching sequence diagram, Fig. 8 and is effected as follows:

- (1) By actuating the "Starting" push-button, the H.T. oil breaker is closed and connects the main transformer in circuit.
- (2) The small motor-generator, located on the L.T. side of the transformer, starts up, and, by exciting the separate pre-excitation field winding, impresses the

partial excitation is sufficient to cause the convertor to adopt the correct polarity.

The Equipment for Automatic Starting of the Convertors

When deciding whether it is of advantage to automatize a sub-station, it is frequently practice to contrast the savings to be realized by reducing the number of attendants, with the greater outlay for interest and maintenance of additional equipment. Such deliberation, however, leads to wrong conclusions, since service reliability, which is one of the most essential factors, is ignored. The starting up of a rotary convertor by hand demands the services of skilled persons, because it involves much more than simply closing an oil breaker as is the case in ordinary switching stations, which can be effected by semi-skilled operators. Apart from the pure expenses, the necessity of automatizing a plant becomes more pronounced as the demands placed on the attendants by the plant increase, and as reliable service becomes more dependent on the skill of the personnel. Although no marked savings as to service costs would have resulted, it was decided, for the above reasons, to include automatic plant for starting up the convertors in the Tokio station. It would have been a simple matter to provide a completely automatic service by including the necessary auxiliary

gear for the D.C. side, but it was decided to restrict the

correct polarity on the convertor at the outset.

- (3) By means of the starting switch 40, the convertor, whose field is weakened, is connected to one of the transformer voltage taps and starts up asynchronously.
- (4) Falling into step of the machines with the correct polarity is indicated by a polarized relay, and the actual field of the convertors is strengthened by short-circuiting the field weakening resistance.
- (5) The starting switch 40 is opened and at the same moment the convertor is connected to the full transformer voltage by means of the switch 41 via the change-over resistance.
- (6) On closing the switch 42, the change-over resistance is short circuited after a short time lag, whereupon the starting process is concluded, which is indicated by a pilot lamp on the switchboard.

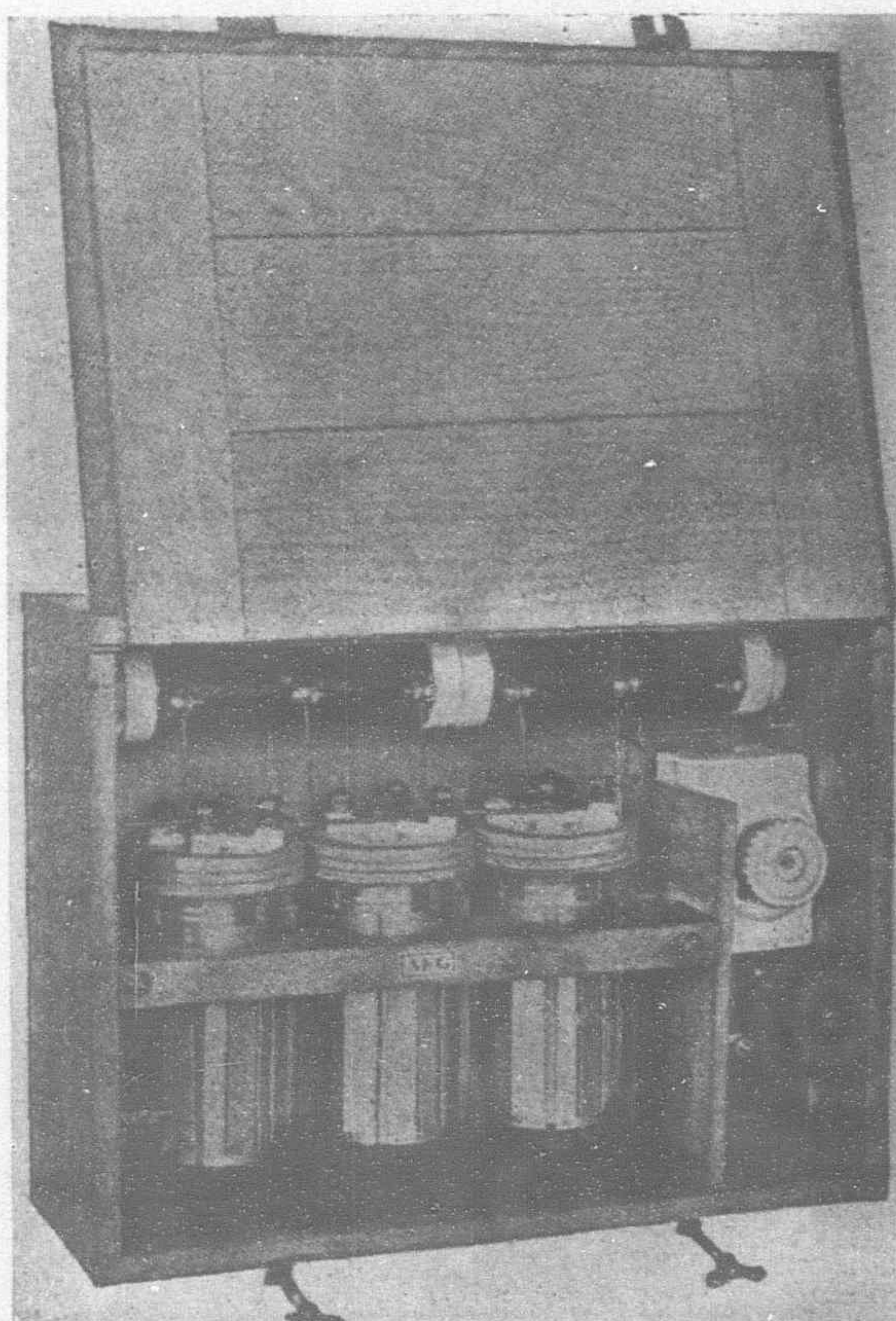


Fig. 6.—Aluminium Over-voltage Arrestor

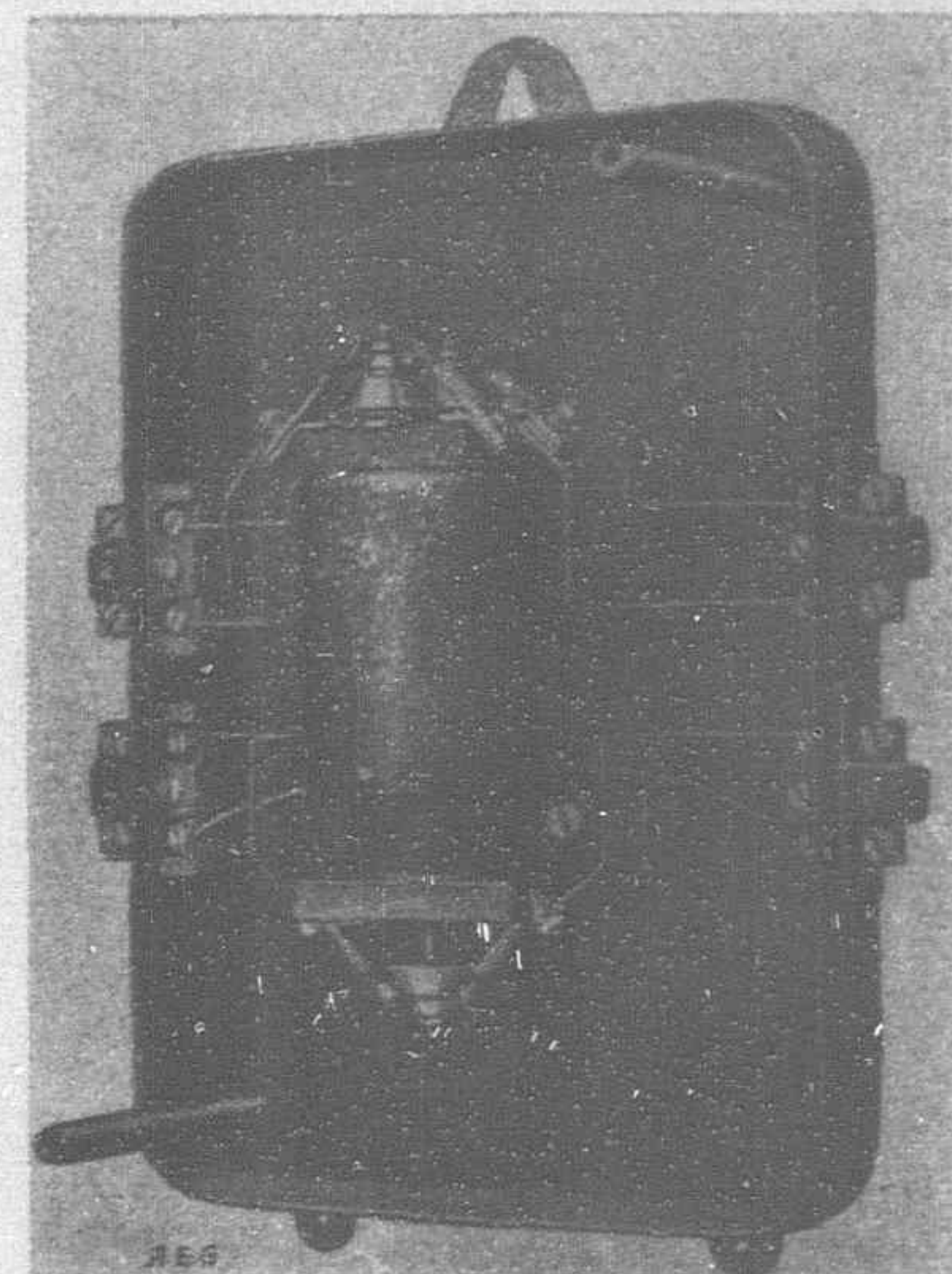


Fig. 11.—Direct Current Auxiliary Relay

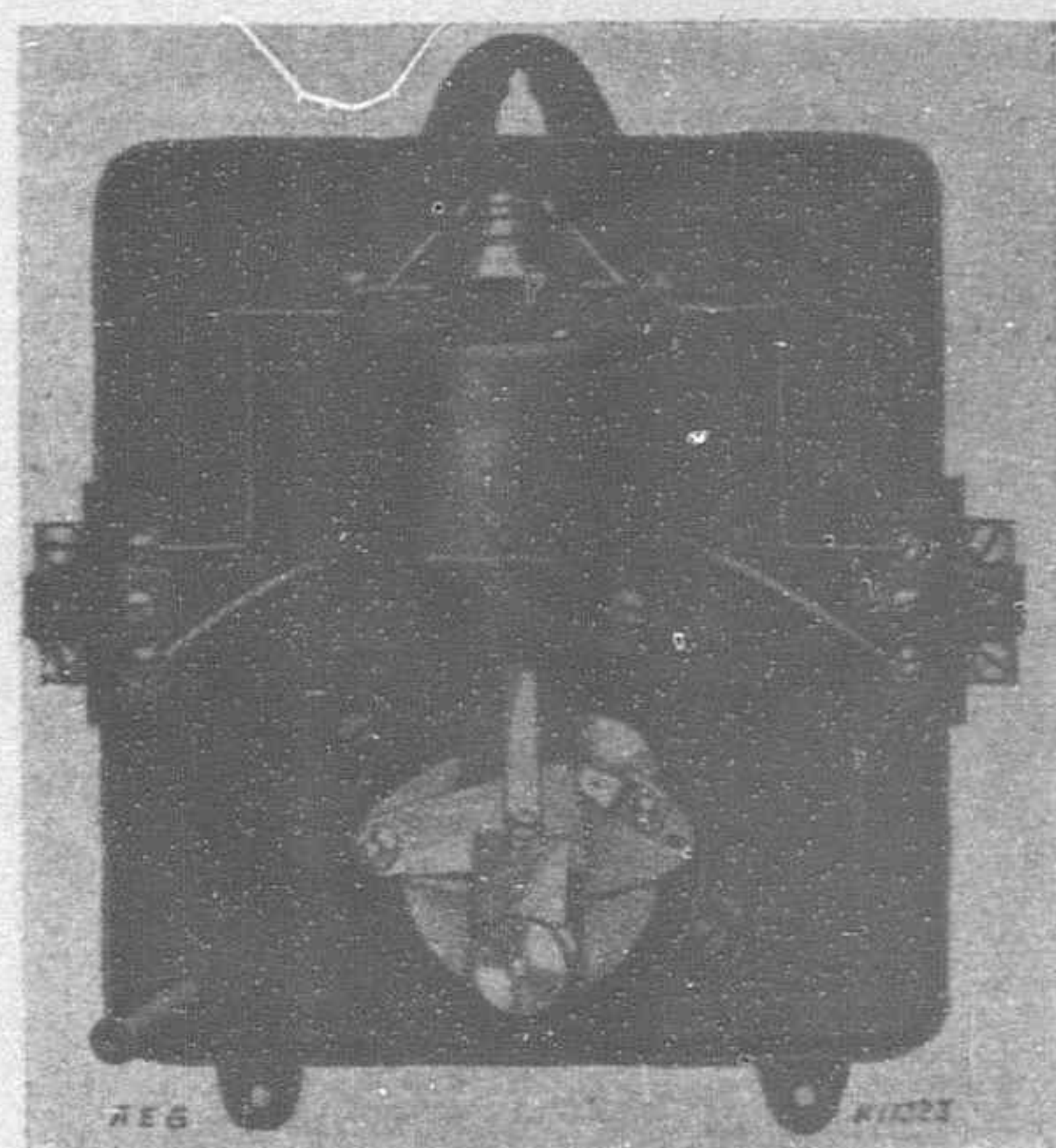


Fig. 12.—Direct Current Time Relay

The individual operations are designated in Fig. 8 as follows: Switching operation (1) by the letter B. (2) and (3) by C, (4) and (5) by D, (6) by E.

Apart from the automatic operation of the various switching apparatus, the starting process is similar to the well-known asynchronous method of starting by means of starting change-over switches. Contrasted with the latter method, the new one demonstrates a series of advantages: (a) During starting, the magnetization current rush is subdivided, since the transformer and convertor are switched in sequence. (b) Changing of the polarity of the field winding is avoided, because the convertor automatically assumes the correct polarity, due to the pre-excitation. A battery could naturally also be utilized for pre-exciting the convertor, but, having regard to service reliability and the small capacity of the existing auxiliary battery, preference was imparted to the small motor-generator, the battery being merely connected up in a suitable manner as a stand-by.

Pre-excitation is only needed during the starting period. On the pilot lamp indicating that the machine has started up, the small motor-generator is automatically disconnected and the field of the convertor takes over the excitation

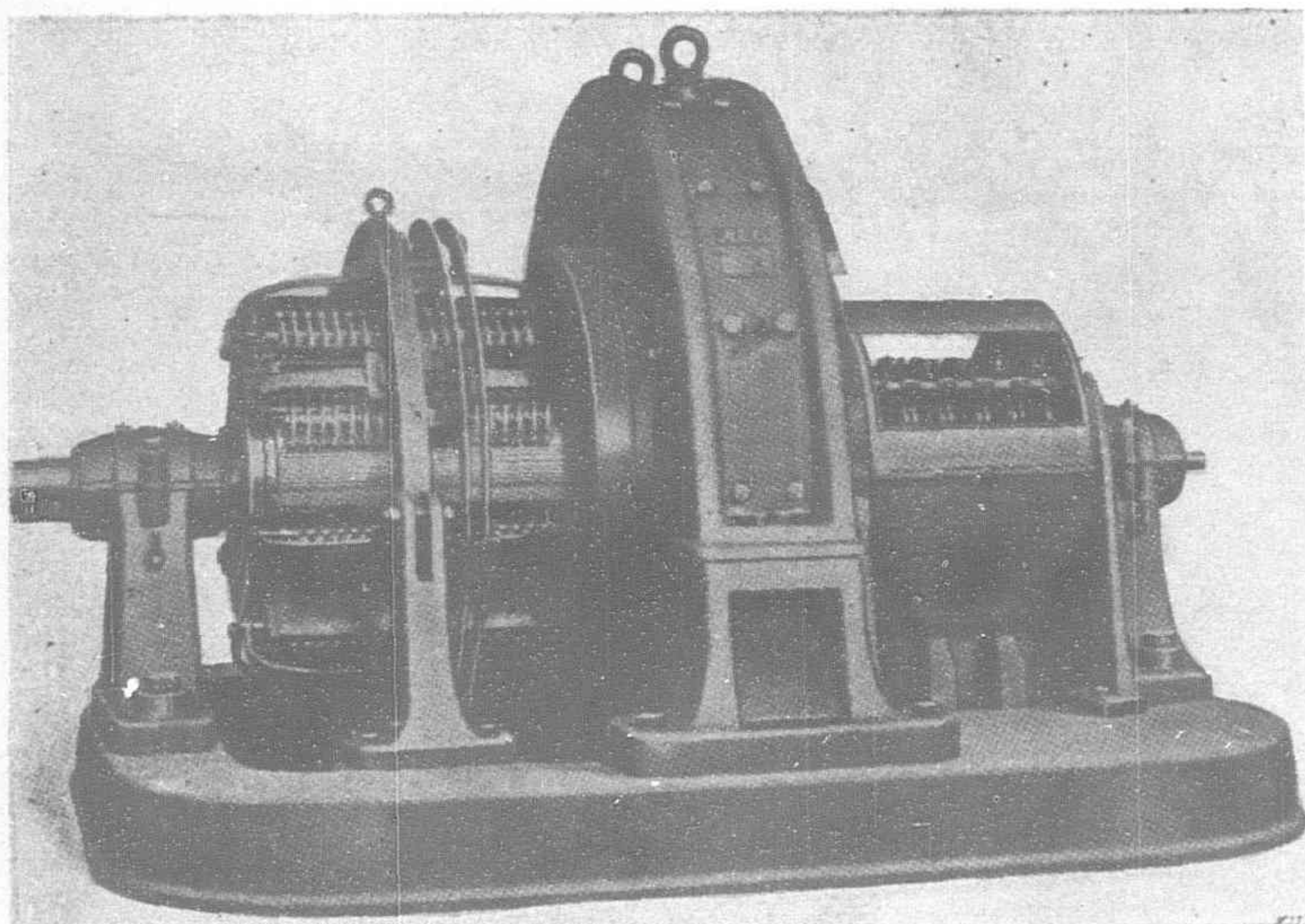


Fig. 7.—Rotary Converter

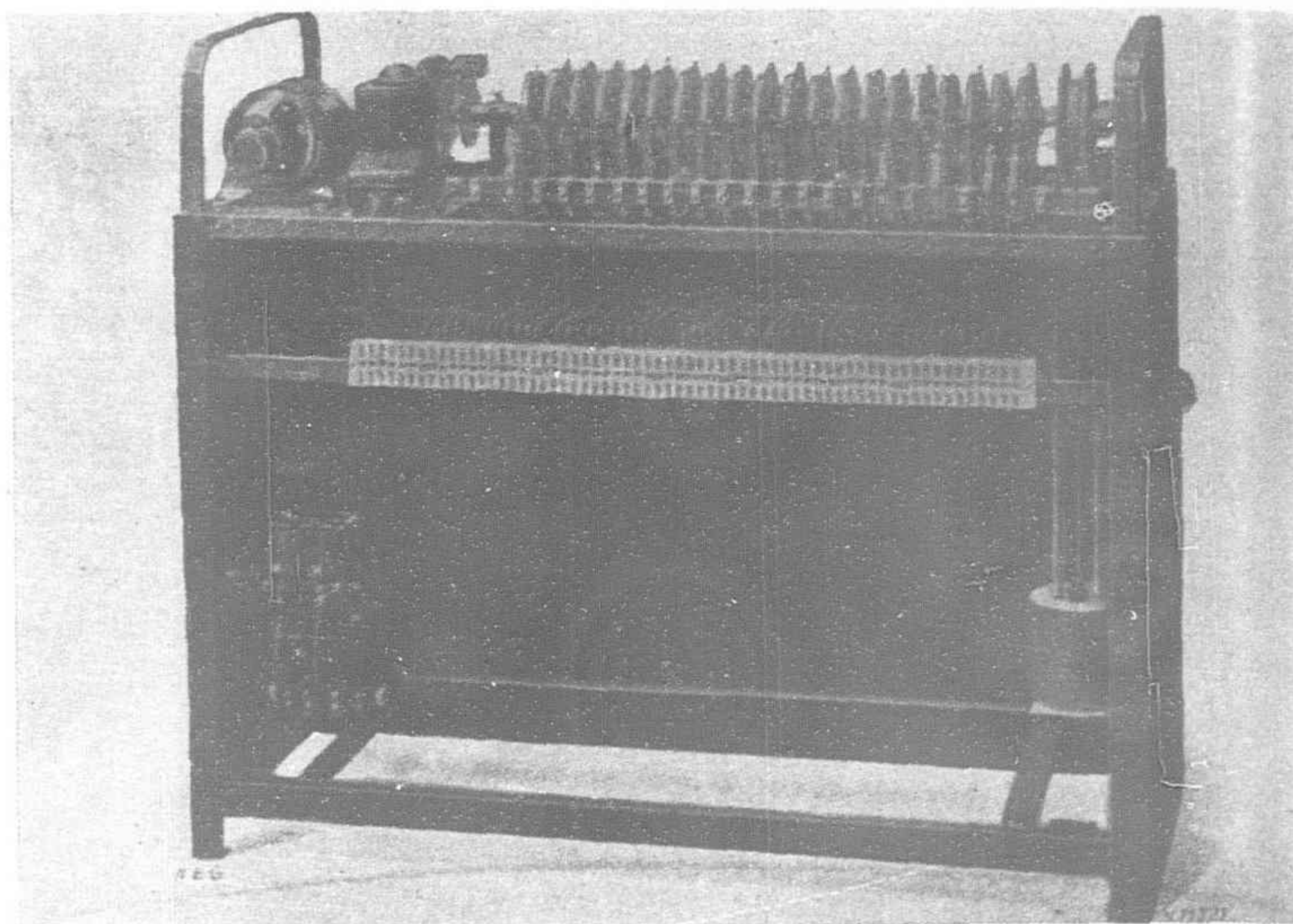


Fig. 9.—Master Drum Type Controller

alone. During the entire starting period, the shunt rheostat of the main field is fixed to a definite ohmic value, at which the wattless consumption of the converter remains within reasonable limits. If the machine is in operation, the rheostat can be adjusted by hand, in order to obtain the best possible power factor.

All the above described switching operations are controlled by a motor-driven master drum type controller, as may be seen from the diagram, Fig. 8. The great advantage of employing a master drum type controller for an automatic plant of this description is the perfect reliability of the entire system. For every important switching operation, it is necessary, that, firstly, the corresponding relay gives the command to proceed with switching, and that, secondly, the master controller be in a definite position. Hence, faulty switching, which would otherwise have to be feared on failure of some relay or auxiliary contact, is precluded. The controller is so designed as to reduce the number of relays and auxiliary contacts required. Its construction is a logical development of the extremely reliable hand-operated controller approved for all traction and cranes purposes.

Fig. 9 depicts the master controller with contactors, motor and electrical coupling. On the right may be seen a weight, which immediately returns the controller to the "off" position when the plant is disconnected.

The segments of the controller are "closed" in the "off" position, so that all circuits that are necessary for the next start are closed. Re-switching is prevented until all starting switches, etc., are in the correct position, which is controlled by auxiliary contacts in the first circuit of the switching sequence diagram, Fig. 8.

Another important switching device, which is not to be found in a hand-operated plant, is the polarized synchronizing relay, Fig. 10. It serves the dual purpose of determining the falling-into-step of the converters and the correct polarity. The relay consists of a moving coil system, which is connected to

the machine. At the moment when the stationary converter is switched in, the relay obtains the full three-phase frequency. On the machine falling into synchronism, the superimposed alternating current disappears and the prevailing direct current allows the relay to effectively close its contacts, whereby the auxiliary relay of the pole relay is actuated and introduces the subsequent switching operations. The converter starts with brushes down and the starting voltage is kept so low that no injurious sparking on the commutator can occur. Hence, the employment of the comparatively complicated brush-lifting device, which requires a special motor drive for automatic operation, is avoided. One of the normal auxiliary relays, which is also used as an exciter voltage relay, is shown in Fig. 11. Fig. 12 depicts a time relay for a retardation up to 10 sec., which operates on the eddy current brake system in contradistinction to the usual design with air damping.

The entire automatic equipment of a machine as described above can be shut down by a common throw-over switch mounted on the switchboard. In this way, it is possible, at some suitable period, to acquaint the personnel with the peculiarities of manual starting, so as to be prepared for any contingencies. After disconnecting the automatic plant, manual starting can be effected by a small hand-operated controller, which ensures correct sequence of starting.

Protective Equipments for the Convertors

Corresponding with the viewpoint expressed on page 5, the converter is also equipped with a number of auxiliary protective devices, besides the ordinary three-phase over-current and under-voltage relays and direct current over-current and reverse-current relays.

The transformers are provided with contact-thermometers and Buchholz relays, whose primary contacts as also the contact-thermometer actuate an alarm; the main contacts of the Buchholz relay effect instantaneous tripping of the oil breakers.

(Continued on page 224.)

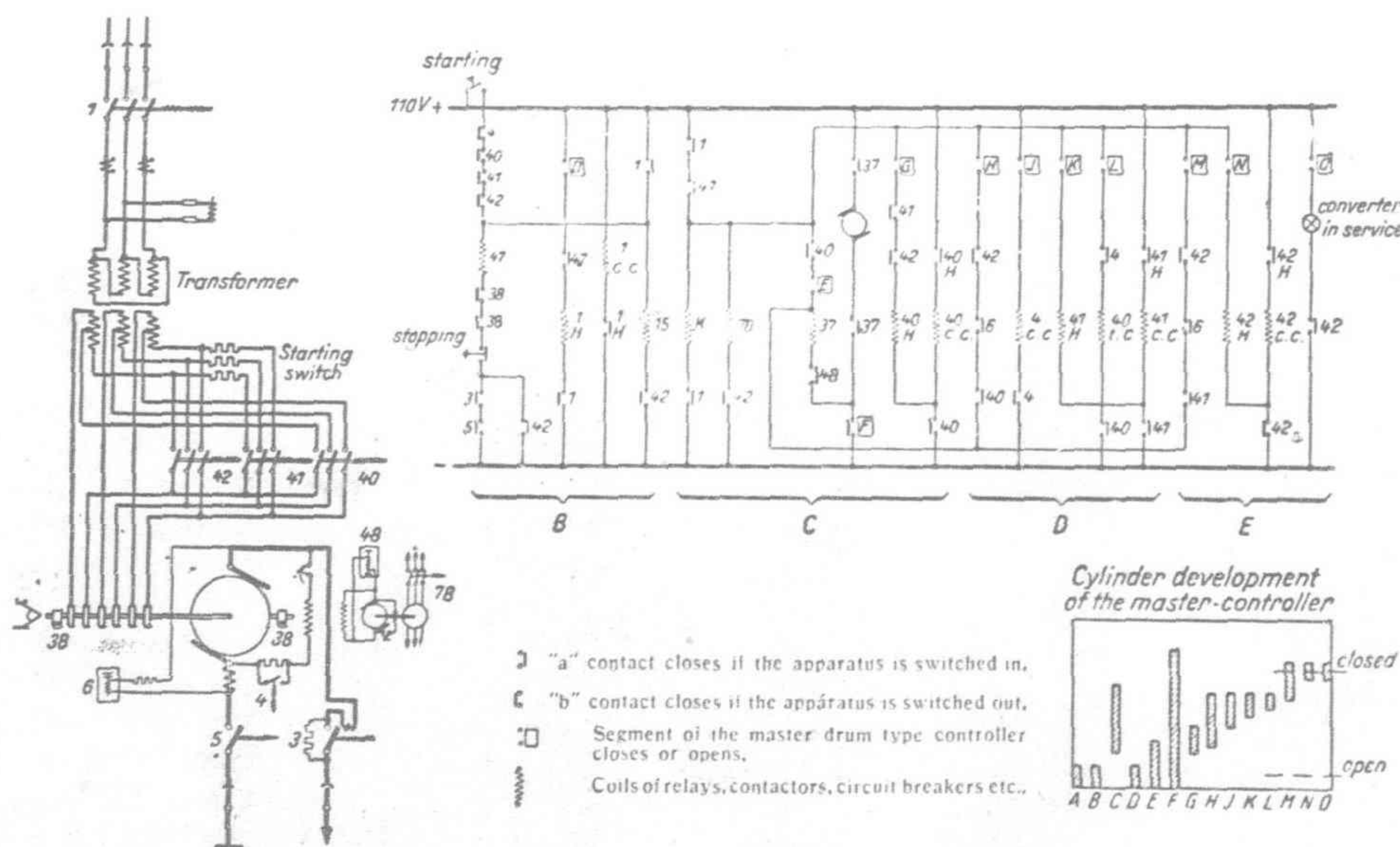


Fig. 8.—Switching Sequence Diagram

- | | | | |
|---------|---|------|--|
| (C. C.) | Closing coil, | (5) | Direct current automatic circuit breaker, |
| (T. C.) | Trip coil, | (6) | Polarised synchronizing relay, |
| (K) | Electrical coupling of the master drum type controller, | (37) | Contactors for the motor of the master controller, |
| (H) | Index to the following numbers, signifies auxiliary contactors of the main apparatus, | (38) | Bearing temperature relay, |
| (1) | Oil circuit breaker, | (40) | Automatic starting switch, |
| (3) | High-speed air circuit breaker with parallel resistance, | (41) | Operating relay, |
| (4) | Field weakening switch, | (42) | Exciter voltage relay, |
| | | (48) | Contactors for the motor-generator for pre-excitation. |
| | | (78) | |

New Buildings in Shanghai

By Gertrude Binder

ENGINEERING considerations, in Shanghai, unthought of in most of the world's great cities, were necessitated by the soft, sandy earth, with water a few feet below the surface, on which Shanghai's increasing weight must rest. Piles were required to support rafts on which the structures could be raised. As the size of the buildings became greater, the number and strength of the piles had to be augmented and the dimensions of the rafts enlarged, until, under the Sassoon Building, 1,600 piles in which wood, concrete and steel are combined, were driven to support a raft 325 by 188 feet square. Still other engineering problems arose when it became necessary to convert old buildings to new uses and to increase the size of existing or partly completed edifices.

That Shanghai's capitalists have faith in the city's future and that its population is rapidly increasing is evidenced by the number and character of the buildings now under construction or recently completed. Many of these are hotels, apartments and dwelling houses, two in particular, the Cathay Hotel and Cathay Mansions, being colossal and elaborate structures. Increased housing facilities merely supplement increased business prosperity, as is indicated by the number of office buildings, godowns and commercial establishments being built simultaneously with the first group. Meanwhile, theaters and a clubhouse designed to be extended prepare for the diversion of the public; and schools point conclusively to an intention of permanency in Shanghai's foreign population.

Sassoon House and Cathay Hotel

Since construction was begun in the spring of 1926, a complete change has taken place in the plan of this building. On the upper floors, in the place of a few residential flats, an up-to-date, first-class hotel is being built. The arcades on the ground floor and the two banks remain as before, but a new hotel lobby on Jinkee Road and an entrance to the hotel from the Bund are being provided. Actually, the hotel will have four entrances, from the Bund, from Jinkee Road, from Nanking Road through the arcade and from the central rotunda. The lobby on Jinkee Road will have two galleries, one for women and one for men.

First, second and third floors remain as offices and banks; the fourth, fifth, sixth and seventh floors will be taken up by hotel bedrooms, each with bath and specially designed furniture. On these last four floors the front suites will be de luxe and decorated each in a distinct national style. Three will be oriental, Indian, Japanese and Chinese; a few will be English, modern French and ultra-modern.

The eighth floor will be the main hotel floor. It will have a lounge, reading room, writing room and a large dining-ball room. All of this floor will be specially decorated, the most interesting feature being Lalique glass electric fixtures. The ninth floor will have a Chinese style restaurant de luxe and roof gardens, the tenth floor

an Old English banqueting hall and the eleventh floor private dining rooms. The kitchen on the ninth floor and the service rooms on the eighth will be equipped with the most up-to-date fittings. The ventilation of all public rooms will be provided for by an elaborate air-cooling system installed by York, Shipley & Co.

The conversion of the upper portion of the building from offices to a hotel necessitated the addition of two storeys, thus considerably increasing the weight of the structure and complicating the engineering problems involved in its erection. The extra floors were added after the structural steelwork had been completed by means of reducing the loading from the ground floor upwards. The settlement of the building, which is already quite far advanced, compares very satisfactorily in every direction with that of any of the other heavy structures erected on the Bund within recent years.

In the design and construction of this building, Messrs. G. L. Wilson and F. J. Barrow were the architect and engineer, respectively, for Palmer and Turner. The contractors follow:

For the main building, Sin Jin Kee; Raymond composite patent piles, Hongkong Excavation & Pile Construction Co.; damp-proofing, Andersen, Meyer & Co.; electric wiring, Inniss & Riddle, Ltd.; expanded metal, Truscon Steel Co.; glass, Pilkingtons, Ltd.; heating, plumbing and fire installations, Shanghai Waterworks Fittings Department Co.; doors, frames and architraves, China Woodworking & Dry Kiln Co., Ltd.; structural steelwork, Dorman, Long & Co.; steel windows, Crittall Mfg. Co.; boilers, Ruskin & Hornsby Co., Ltd.; granite, S. V. Chen Kee; sanitary fittings, Doulton & Shank; lift fronts, W. S. Tyler & Co.; boilers, Ruston & Hornsby; Renee Lalique electric fixtures, Breves of England; bronze work, Arts & Crafts, Soy Chong, Shing Tai Electric Co. and Shanghai Engineering & Plating Co.; metalwork to arcades, Sargent & Polis; marblework, Bertuchi & Finachard; furniture, Weeks & Co., Arts & Crafts Co., Hall & Holtz and Tai Chong; Insulite flooring, Fagin & Co., Induroleum, Metropolitan Carriage Co.

Cathay Mansions

There are a number of interesting engineering accomplishments in connection with this 14-storey building which is to be opened early in the spring of next year as a residential hotel. The site was first prepared by putting in 288 Franki cast-in-situ piles. The heads of these piles were connected with a large raft of reinforced concrete. On this raft the wrought steel baseplates, seven inches thick, were put for the steel frame, which was supplied by Messrs. Redpath, Brown of England and weighed about 2,500 tons. The columns of the steel frame were covered with reinforced concrete as fire protection and reinforced concrete floors were cast in each storey height. The exterior walls of the building are of brickwork built hollow and the interior partitions are of hollow brick. The windows, of which there are about 3,000, are of steel supplied by Messrs. Crittall & Co. The building can be considered to be as fire resisting as it is possible for any to be made.

The building is of Gothic character; the elevations being of tapestry brickwork and artificial stone with steel casements. The principal entrance will be from Rue Bourgeat into a spacious

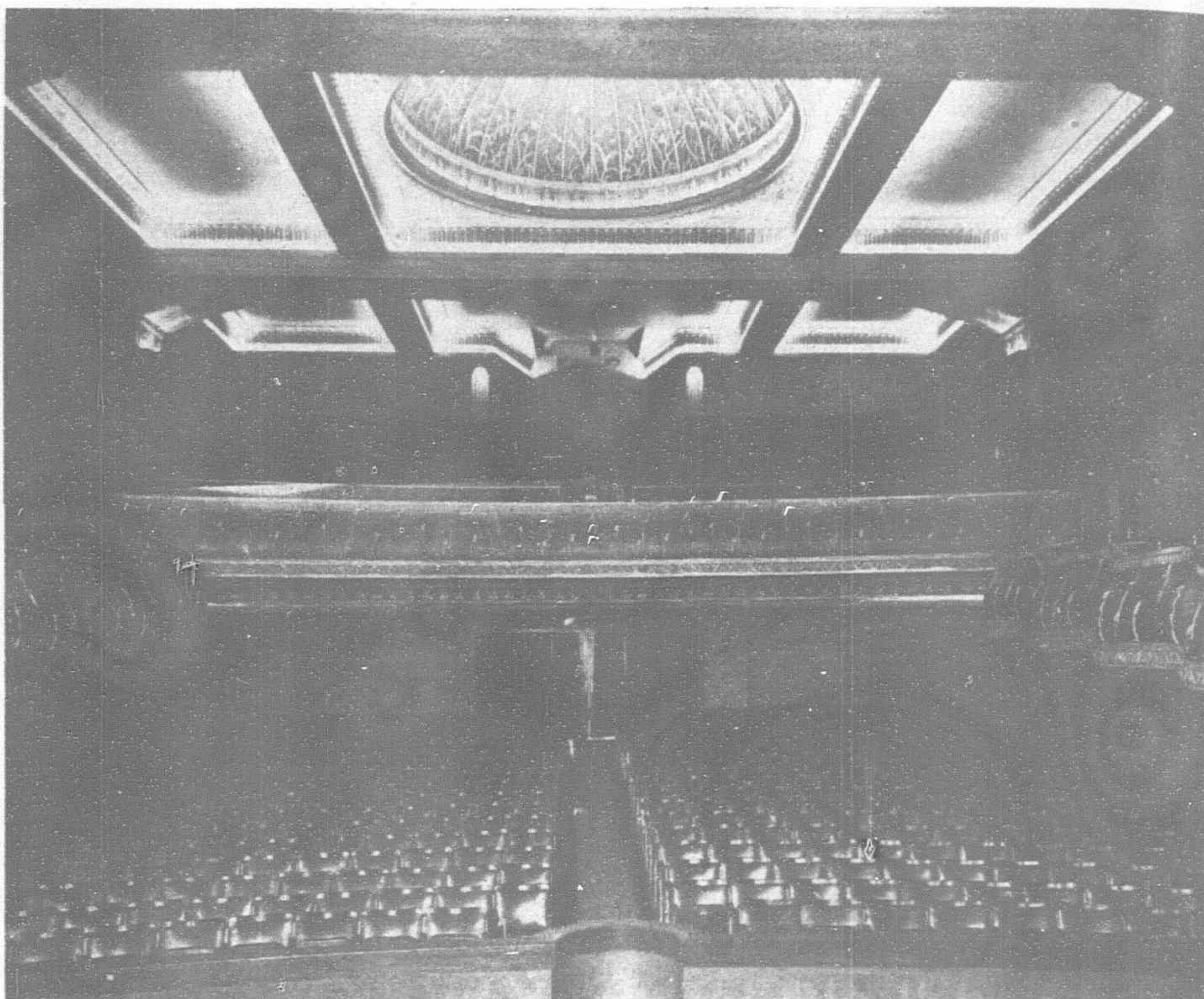


The New Sassoon Building

tea lounge. Beyond the lounge is the lift lobby from which four high speed Otis passenger lifts ascend 170 feet to the roof level. The ground floor will also have a sun lounge on the south side, and a number of shops arranged as an arcade through to the secondary entrance on Route Cardinal Mercier, almost opposite the entrance of the French Club. There will also be shops on the west and north elevations where the sidewalks will be protected by glass canopies. The remainder of the ground floor will be occupied as service and storage rooms, the boiler room being situated in the basement below the ground floor level. The dining room and other public rooms will occupy practically the whole of the 11th floor, from whence magnificent views can be obtained of Shanghai and its environs.

Floors numbers one to ten inclusive will consist of private apartments, bathrooms and linen closets with the most modern types of fittings. The pantry will be situated on the north of the dining room on the 11th floor, the kitchen being immediately above. There will be six food lifts in the building, which, when required, will convey meals to the private apartments. On the top floor will be the quarters of the foreign management and Chinese staff and above this a spacious roof garden and the central tower.

In the construction of this building no expense has been spared to obtain the most modern heating, sanitary, ventilating, refrigerating and electrical appliances; and when completed, it will be the most modernly equipped building of its kind in Shanghai.



View of Auditorium, Seen from Stage, Capitol Theater

The hotel will comprise 279 single apartments, which can be connected to form two, three or four room suites, and large public dining rooms, lounges and card rooms.

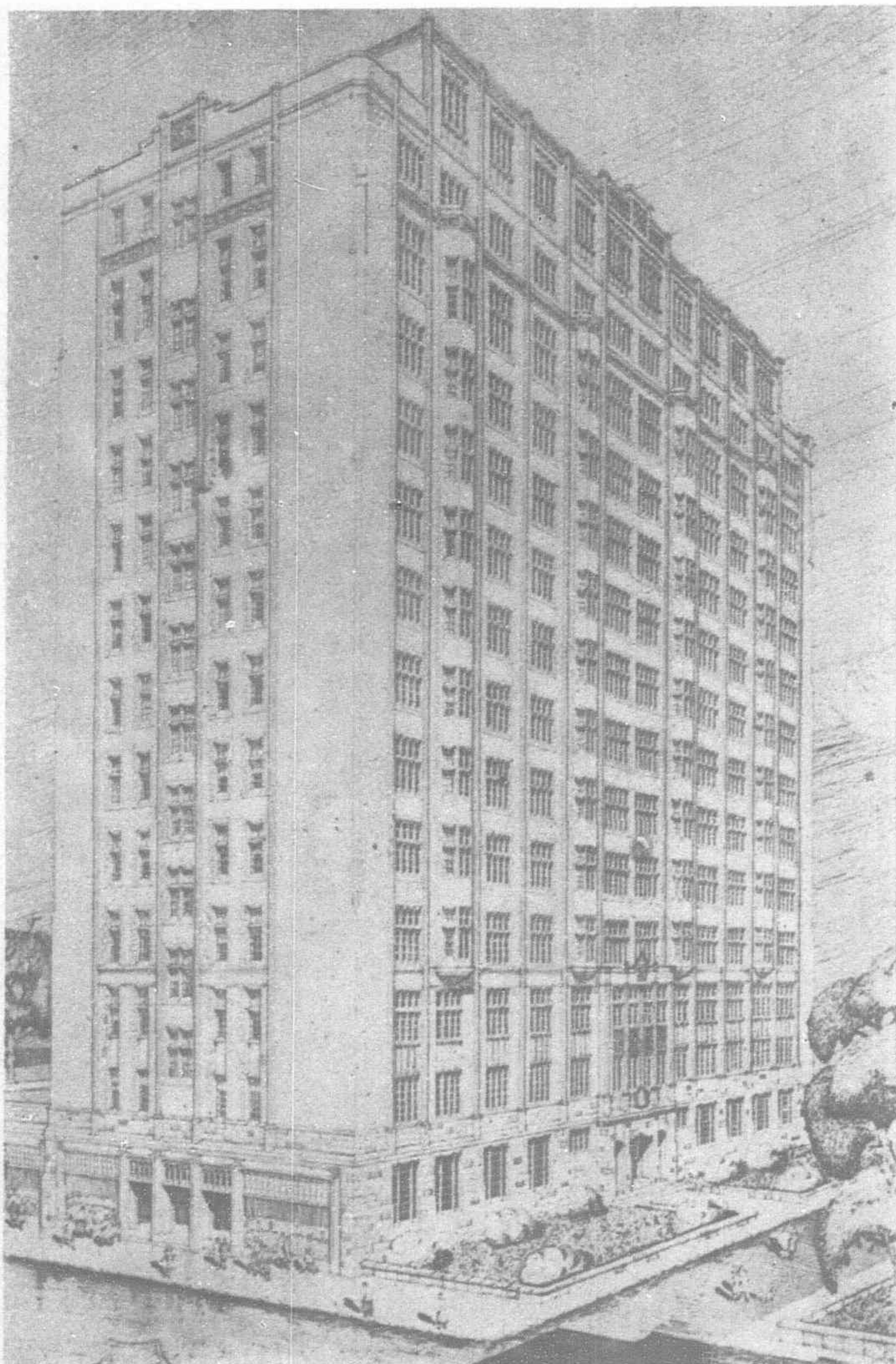
The following is a list of the professional firms and sub-contractors who are assisting in the construction of this building. Architects, Palmer & Turner; civil engineers, Cathay Land Co., Ltd.; general contractor, Wong Kor Sung & Son; mechanical engineers, Arnhold & Co., Ltd.; concrete piling (Franki), Hongkong Engineering & Construction Co., Ltd.; structural steel, Redpath, Brown & Co., Ltd.; electrical engineers, Anderson, Meyer & Co., Ltd.; refrigeration engineers, Sulzer Brothers; heating and sanitary engineers, C. J. Doughty & Co., Inc.; lifts engineers, Otis Elevator Co., of U. S. A.; steel windows, Crittal Mfg. Co., Ltd.; shop fronts and glass, Pilkington Brothers, Ltd.; wall tiling for bathrooms, John Richards of England, (Duncan & Co.) wall tiling for public lobbies, William Jacks & Co.; facing tiles, Tai Shan Co.; wooden flooring, China Import & Export Lumber Co., Ltd.; flooring of corridors, etc., Induroleum (M. C. W. & Finance Co.); boilers, Ruston of England, (Arnhold & Co.); sanitary fittings, Standard Pacific Trading Co.; lavatory basins, Shanks (A. Malcolm); paints, Wilkinson, Heywood & Clark; strong room doors, John Tann of England (Arnhold & Co.); oil burners, Ray of U. S. A. (Langdon & Co.).

Hongkew Hotel

With North Szechuen beginning to rival Nanking Road as an evening promenade for Shanghai Chinese, it is interesting to note that the extension to the Hongkew Hotel at the corner of North Szechuen and Haining Roads which is now being erected by the Shanghai Land Investment Co. will have a number of features intended especially for attractive display. In place of the usual plain, collapsible iron guards for doors, the shops on the ground floor of the new hotel will have patent roller chain shutters finished in bronze, which when closed at night will not obstruct or detract from the window display, so important in the advertising of goods. In addition, all show windows will have patent copper frames.

The building marks another departure for the district in which it is located in that it will be the maximum allowed by the Shanghai Municipal Council. There will be seven storeys with shops, entrance hall to the hotel and kitchens at the rear on the ground floor, and bedrooms with their attendant service rooms on all the floors above. Besides the large passenger lift capable of carrying 13 passengers to the roof garden, there will be food service to all floors.

Work on the reinforced concrete skeleton of the extension, which was carried out in a very efficient and time saving manner, has already been completed. There will be a granite base to the shops. The outside walls of the building will be treated with imitation white marble dressing and the wall spaces with special brick facing tiles, one inch thick. All the windows will be of steel. The



Cathay Mansions

new building is efficiently cut off from the old by means of automatic double fire doors.

The list of contractors includes the following: building, Sin Jin Kee; steel windows, Henry Hope and Son (Duncan and Co.); glass, Pilkington Brothers; lifts, Waygood Otis Co. (American Trading Co.); shop windows, Brasco; shop chain window shutters, Andersen, Meyer and Co. (as agents) fire doors, Mather and Platt; heating, Shanghai Waterworks Fittings Co.; facing bricks, Tai Shan Brick and Tile Co., Ltd.

The extension is to be finished by August, 1929.

Central Hotel

This elaborate Chinese hotel on Canton Road, which was opened just before the Chinese New Year was designed by Palmer & Turner. It is eight storeys high and has 200 bed rooms with public and private baths. On the ground floor are shops, the dining room and an elaborate banquet hall with domed lights in beautiful colors as an especial feature. The general contractor for the building was Sing King Kee; the plumbing and heating were installed by Elm & Co. and the electric lights by Shun Tai & Co. There are two American lifts from the Waygood Otis Co.

Great China Hotel

In the Great China Hotel at the corner of Foochow and Thibet Roads, which was opened the sixteenth of January this year, no effort has been spared to arrange for lodging, feeding and serving guests in a way which will give them absolute satisfaction.

The scheme of the public rooms is to provide a proper setting for teas, dinners, balls, banquets, weddings and theatrical entertainments of any size, from small private affairs to large gatherings, and to insure any degree of privacy. Two large rooms capable of accommodating one thousand people are supplemented by numerous private dining and banquet rooms. Of these, the main ball room on the ground floor, in the style of the Italian renaissance with marble columns and richly ornamented ceiling, is fully equipped for tea dances and formal dinner dances. It is two storeys high with a dining balcony, orchestra procenium and oak flooring. Two entrances connect with the hotel lobby and Foochow Road. At the southern end of the building on the ground floor and accessible from Thibet Road and the lobby, is the lounge which may be used for weddings or banquets. Decorations here are of Louis XV type. Adjoining the ball room are the bar, a grill and a suite of private dining rooms. The remainder of the ground floor is given over to lobby, general and private offices and kitchen department lavatories.

Two Otis elevators connecting with the main lobby run from the ground floor to the roof, which has been specially constructed for the use of guests who may enjoy afternoon tea in the open. From this vantage point there is a splendid view of the race-course and recreation fields which lie immediately below in front of the hotel.

All upper floors are laid out in suites and single rooms with a number of apartments including private baths. Each guest room is fitted with a lavatory with hot and cold running water. In addition, there is on each floor a tank fitted with copper coils heated with live steam for the purpose of boiling water for tea.

The building contains about 200 guest rooms, and due to the fortunate orientation and careful planning each room, corridor and bathroom is exposed to the sunlight at some period of the day, thus insuring a clean, healthful and cheery atmosphere. All the wood-work of the upper floors is painted in cream enamel, while the

ground floor finishings are of hardwood treated in stains and varnishes.

That the section of the city in which the Great China Hotel is located is a desirable one and might become a hotel center for Shanghai, much as Michigan Boulevard is for Chicago, is evidenced by the fact that upon its opening, every room in the hotel had been engaged.

The building is constructed of reinforced concrete and complies in every way with the latest regulations concerning emergency exits and fire-fighting equipment.

The architect for this hotel was Francis Berndt. The general construction works were carried out by the Kow Kee Construction Co., while all mechanical equipment was provided by the Great Light Electric Co. The cost was Tls. 300,000.

Private Hotels and Residences

Percy Tilley is the architect who has designed a series of foreign residences, residential flats and private hotels all of which are to be completed by the end of July this year.

The first of the group to be finished will be a block of residential flats on Rue Frelupt near Route Dufour which will be ready for use in March. The apartments were designed with the idea of providing plentiful light and air. All modern appointments are being installed, including steam heat and built-in furniture. The general contractor is Yans Say Kee.

Fifty small foreign residences, to be completed about the end of June, are being erected on Route Cardinal Mercier. Each house has two sitting rooms, two bedrooms, kitchen, pantry and servants' room. Steam heat, gas and electric heating will be available for the occupants. K. S. Chuck is the contractor.

A private hotel of 30 bedrooms, each with private bath, and with all modern equipment for heating and sanitation will be located on Rue Lafayette. Besides the bedrooms the hotel will have a large public dining room, private dining rooms, drawing room, billiard room, lounge hall and barber shop. The building will be ready for occupation in July. Sin Yue Kee is providing the construction materials.

The last item in the series, also to be completed by the end of July, is a group of modern shops with two floors of residential flats above, which will be erected on Rue Lafayette, near Route Pere Robert. The flats will be small, each made up of one sitting room, one bedroom with bathroom attached, a kitchen, pantry and servants' rooms. There will be open fireplaces, provision for gas or electric heating and modern sanitation.

Capitol and Grand Theaters

In these two new theaters, the architects, Messrs. Gonda and Busch, have not only given Shanghai attractive amusement houses, but have initiated into the Far East the new, logical tendency in interior decorating which adapts the design to the constructional methods and use of the building. Since these are cinema houses, the conventional forms, taken from bygone architectural periods and a time when cinematographic technique was unknown, have been abandoned, and an effort has been made to harmonize ornamentation with use.

In the Grand Theater, a particularly difficult task was entrusted to the architects by the Grand Theater Corporation, an American company, which leased the premises of the Carlton Ballroom at 50 Bubbling Well Road for the purpose of



The Hotel Great China, 1928

transforming them into a cinema house. To transform the ball-room into a theater entailed both careful planning and construction. The building of a balcony for the new theater was solved by the erection of a big structural steel truss spanning the entire width of the auditorium and resting on new steel columns. From this steel truss the balcony cantilevers out leaving considerable headroom for the stalls in the auditorium. In order to achieve the appropriate sight lines the auditorium floor had to be taken out entirely and a new concrete floor on a lower level put in. A special steel construction for the new stage and the proscenium arch was erected and the silver screen installed in such a position as to secure the best possible vision from every seat in the house. A motion picture booth, entirely fireproof and ventilated directly from the outside above the roof of the building, was equipped with two Simplex projectors installed in such a way as to throw the pictures on the screen so that the angle of projection is the most favorable for the spectators.

Ample exit stairways and passages with all up-to-date appliances for fire protection secure perfect safety for patrons of the theater. In the arrangement of the seating special care has been taken, apart from the fact of commodious spacing, to supply ample intersecting gangways in order to provide easy ingress and egress. For hot-weather use, exhaust fans have been provided to purify and cool the air of the auditorium, lobbies, foyer and tea rooms, in which more than a thousand people can be accommodated.

The color scheme of the interior decoration is warm brown and red, which, in combination with the well-arranged lighting, achieves quite an extraordinary effect. The art glass ceiling, the art curtain and the sculptural decoration of the proscenium arch add to the beauty of the theater.

This building is an excellent example of what careful designing and modern technical methods can do to an edifice the destination of which must be changed. The architects, Gonda and Busch and the consulting engineers, Andersen, Meyer & Co., were assisted by the following contractors:

Building, Tsa Ling Kee; flooring, Duncan & Co.; heating and ventilating, Reyer & Co.; electric installation, Wessels & Co.; painting, etc., Lehonos Art Co.; chairs and furniture, Tai Chong & Co., Ltd.; art glass, etc., Arts & Crafts.

In designing the Capitol Theater, Mr. C. H. Gonda had a free hand and was able to create a theater to compete with those of Europe and America. The entrance doors from the lobby to the stalls are in straight and simple lines with a decorative picture above. An unusual effect is achieved in the ceiling by the use of concealed electric lighting behind the center cornices. In the auditorium, the essential features of construction of the ceiling, the beams supporting the superstructure, are emphasized in the design and the exquisitely decorated dome from which concealed lighting effects are carried to all parts of the hall. The blue-gold wall is executed in a rough cast finish and is adorned by sculptural panels of allegorical figures depicting Art, Music and Dancing. In the proscenium arch, straight lines, allegorical figures carefully adapted indirect lighting emphasize the structural lines of the proscenium opening.

A remarkable detail of the Capitol is embodied in one of the stairways leading to the dress circles. Here the old-fashioned and impractical bronze railing is replaced by a modern concrete balustrade suitably ornamented and uniquely finished in amber and blue. Art glass windows above were designed by using geometrical figures and well-blended colored glass, the effect of which, by day and by night, is astoundingly good.

The plaster work and decorating in the theater was executed by Arts & Crafts, the painting by the Upson Paint Co., the decorative painting by V. Podgursky and the sculptural work by Mr. Koppany.

The International Recreation Club

Palmer & Turner are the architects for the new building of the International Recreation Club on Bubbling Well Road which is just being completed. The clubhouse is designed to provide every comfort and every convenience for the members of the organization it will house. In a north wing facing Burkill Road a modern gymnasium has been equipped on the first floor, while the ground floor is given over to a bowling alley. On the ground floor of the main building there are a magnificent hall with bar adjoining, reading room, lounges and offices. The assembly hall, public and private dining rooms, billiard room, mah-jongg and card rooms and

ladies rooms are on the first floor with the kitchens and servants' quarters above. The edifice has been constructed in such a way as to make it possible to enlarge it as the activities and membership of the club increase.

The general contractors for the club building are Fong Saey Kee & Co. The facing brick and roof tiles were specially manufactured, the former by the Manufacture Ceramique de Shanghai and the latter, which are a sand-faced English pattern, by the Soochow Brick & Tile Co. The steel window sashes are from the Crittal Manufacturing Co.; the flooring is being supplied and laid by the China Import & Export Lumber Co. Floor tiles are by W. Jacks & Co. and wall tiles by Rubin & Co. The malthoid roofing and the waterproofing and damp-proofing of the ground floor are by Duncan & Co. The New Engineering & Shipbuilding Co. have supplied the steel roof trusses.

The heating and sanitary equipments have been installed by the Shanghai Waterworks Co. By the use of copper pipe for the hot and cold water service a very superior job has been given at comparatively slight extra cost. The whole of the electric light wiring is being executed by Scott, Harding & Co.

Weeks and Co. have been responsible for the interior decorating of the entrance hall and the remainder of the interior paneling has been done by Tai Chong and Co. Sanitary fittings have been provided by Malcolm and Co., Shanghai agents of Shanks and Co.

The bowling alley equipment has come from Brunswick, Balke Co. through Paul I. Fagin & Co., the local agents. The gymnasium equipment was manufactured by Spencer, Heath & George of London and the billiard tables by E. J. Riley & Co. whose Shanghai agents are Cecil Holliday & Co. The lockers and hardware were secured from Gibbons & Co. through Arnold & Co. who are also the agents for Scott Harding & Co. who provided the ventilation equipment.

The marble pavement of the inner hall is in the hands of Tan Kai & Co.

Shanghai Cotton Manufacturing Co.

Another structure, also in the hands of Palmer & Turner, at the corner of Pingliang and Tsitsihar Roads will provide office accommodations for the Shanghai Cotton Manufacturing Co., or Shanghai Boshoku Kabushiki Kwaisha.

The architects have made an effort to design a simple and economic office building as a suitable adjunct to an industrial enterprise. The ground floor will include space for the general and engineers offices, first aid and medical rooms, engineers stores, two dining halls for mill employees and waste picking rooms. The first floor will house the staff and foremen's dining halls, waiting rooms, kitchen and pantry. The second floor will be given over to residential quarters, with attractive accommodations for the nineteen senior members of the staff.

The whole building will be of reinforced concrete, fire-resisting construction, with the elevations finished in local brick. On the second floor an attempt has been made to avoid the numerous columns usually associated with a verandah by providing an overhanging roof. The roof will be finished with green-stained cement tiles which should form an interesting contrast in color.

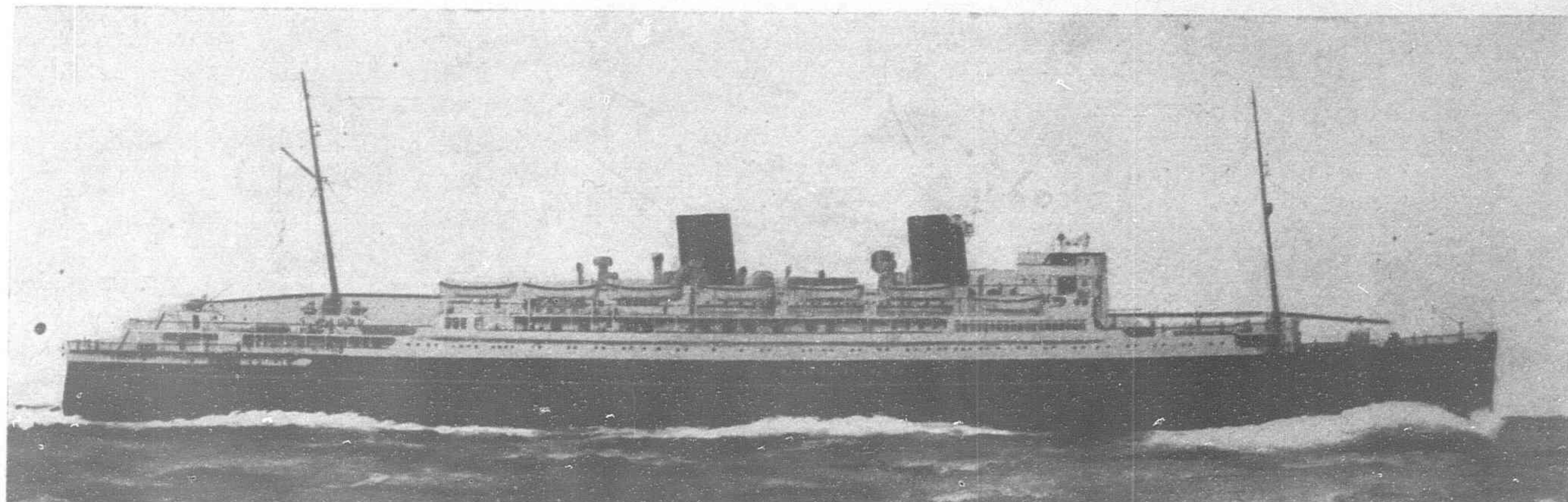
The general contractors for this undertaking are Chang Sing & Co. Steel window sashes are being supplied by Truscon & Co. The roof insulation, which is of Celotex, and the bitumen roof covering are from Paul I. Fagin.

Cathedral and German Schools

One of the evidences of permanency in a community and of foresight among its members is the building of schools. There is proof that Shanghai's foreign population is not entirely transient in the fact that two schoolhouses for European children have been worn out and are now being replaced by new buildings with modern equipment. One is the Deutsches Gemeindhaus, successor to the Kaiser-Wilhelm-Schule, for German children, and the other the Cathedral School for British boys.

The new German school will be situated on the corner of Great Western Road and Avenue Haig instead of No. 95 Wei-Hai-Wei Road where the Kaiser-Wilhelm-Schule was located. It has been believed for some time that the location on Wei-Hai-Wei Road is no longer suitable for a school, but the problem of removal was particularly difficult to solve since the enterprise is supported only by local Germans and is a heavy burden for so small a community. It was necessary to sell the old site and secure a new one at a price low enough to leave a sum from the sale money for the erection of a

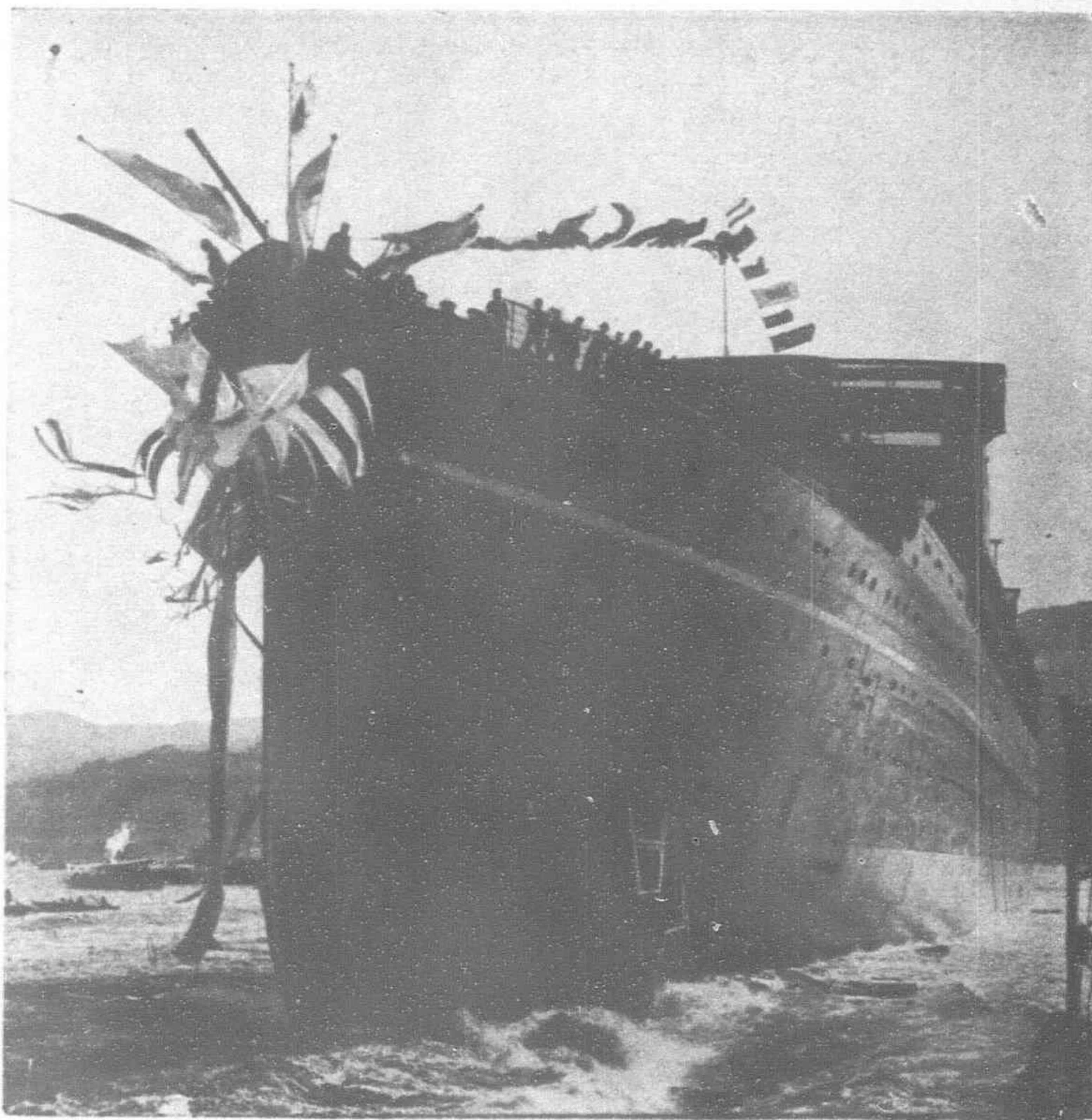
(Continued on page 224).



"Asama Maru"

The Nagasaki Works, Mitsubishi Zosen Kaisha, Ltd.

POETRY and romance have woven such a charm around the name of Nagasaki that it is not easy to visualize this ancient city—the chief southwestern town of Japan—as a big industrial center. It is well known that Occidental ideas and learning first reached this country through Nagasaki, but probably few are aware that this port can also justly claim the distinction of having been the cradle of the shipbuilding industry in the Japanese Empire, for it was here so long ago as the year 1857 that the Shogun's Government in the old feudal days, founded a small plant for the repair of ships, and from that very small collection of workshops there has been developed one of the largest shipbuilding and engineering works in the Far East, possessing all facilities for constructing and completely equipping vessels of the largest dimensions.



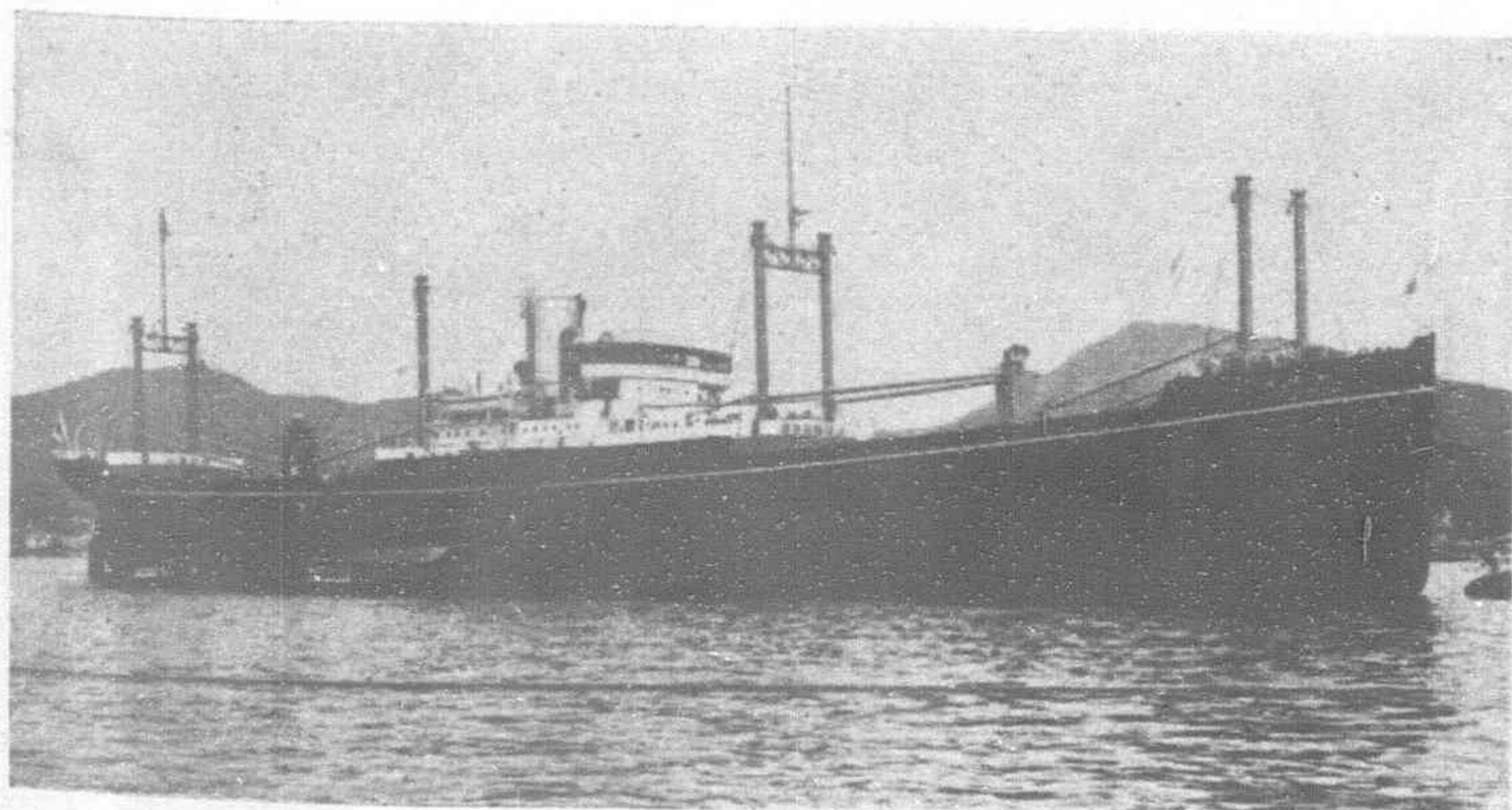
Launching of the "Asama Maru"

The works now occupy a total area of about 156 acres, with a water frontage extending about two miles in length on the west shore of Nagasaki harbor.

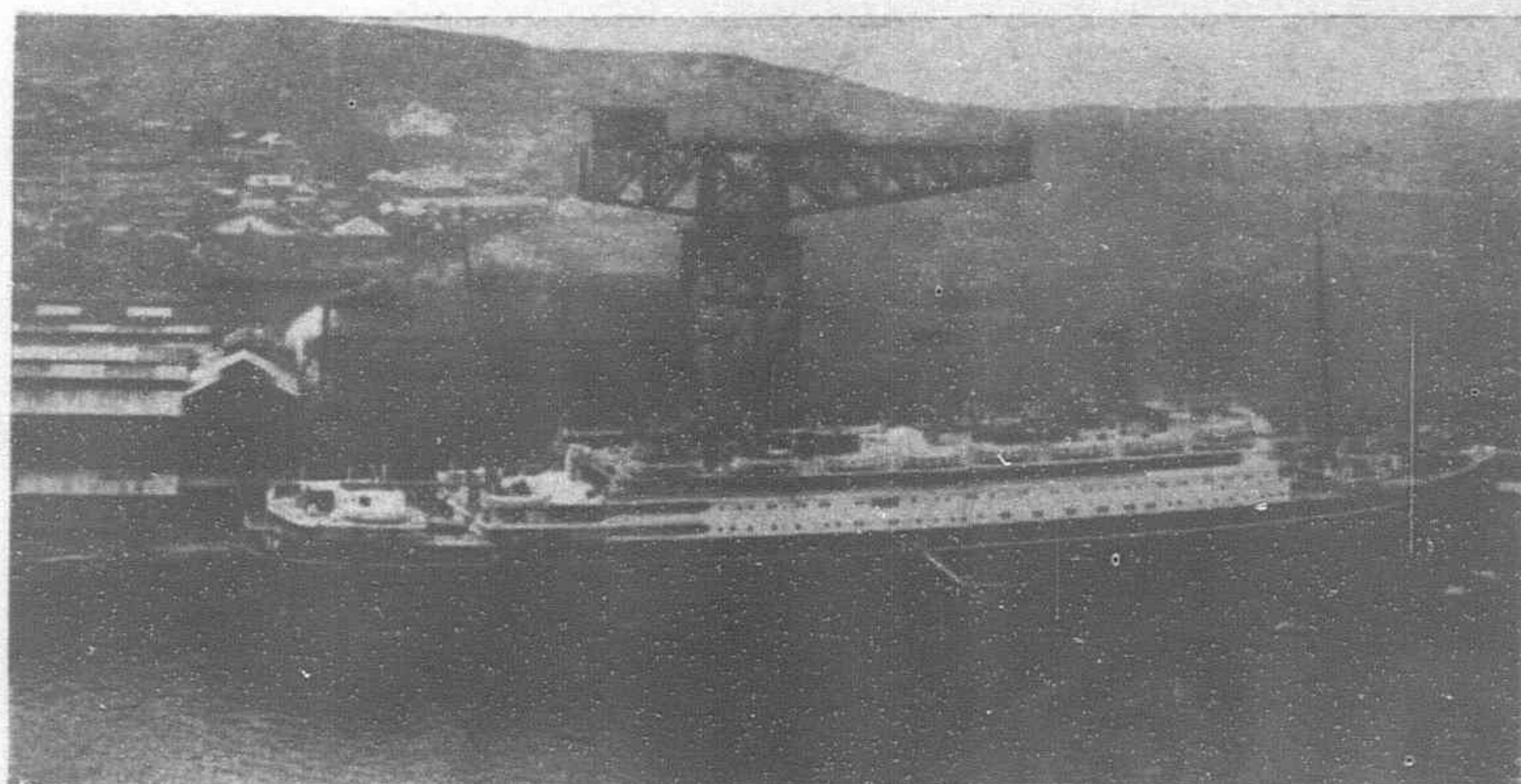
The shipyard at Tategami consists of six concrete building berths and the workshops, numbering about 30 buildings in all, comprises the usual Iron Worker's Shop, Wood Worker's Shop, etc. No. 1 building berth is equipped with a huge gantry crane while the other berths are provided with a total of 16 jigger posts and two tower cranes.

The machinery works at Akunoura include fitters, machine, boiler, foundry, forge, smiths and tool shops, as well as the fitting-out shop, electric works, copper smiths, rigging shops, power house, etc. A giant hammer head crane with a lifting capacity of 150 tons stands on the jetty.

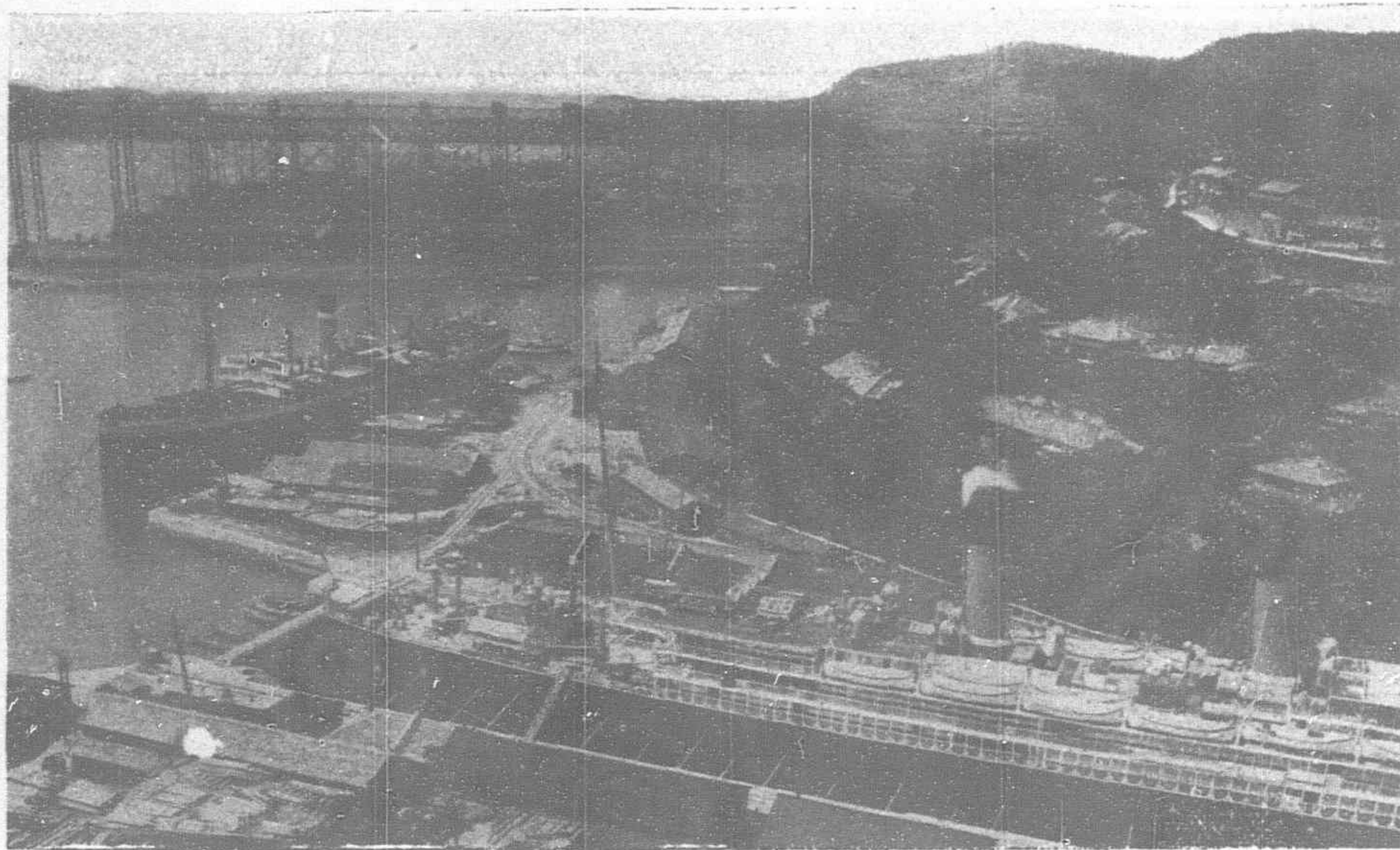
The three dry docks are constructed of stone, the largest



Motor Cargo Ship "Shunten-Maru," Built at Nagasaki Works, Mitsubishi Zosen Kaisha for the Yamamoto Shoji Kaisha, Osaka.



General View of Akunoura Machinery Works at Nagasaki Works, Mitsubishi Zosen Kaisha



A View of the Tategami Shipyard at the Nagasaki Works

one being capable of taking vessels of over 20,000 tons gross.

As is well known, very few private shipbuilding yards in the world can boast of possessing their own experimental tank, and naturally the Company is proud of the tank which it has located at the works. Of particular note also is the works research laboratory, the equipment of which is complete in every detail, and is on such a large scale as cannot be found in any other establishment in the country.

The works have two floating cranes, with a lifting capacity of 60 and 40 tons respectively, besides various types of heavy tugs, steam launches, motor boats, etc.,

Operating in close conjunction with the sister works, such as Kobe and Hikoshima (near Moji) works of our own Company and many works of Mitsubishi Electrical Engineering Co. and other Mitsubishi concerns, the works are in a position to construct and repair vessels and machines of all classes and sizes with the greatest expedition.

The works engage in every branch of shipbuilding and engineering, and undertake the design, construction and repair of all classes of :—

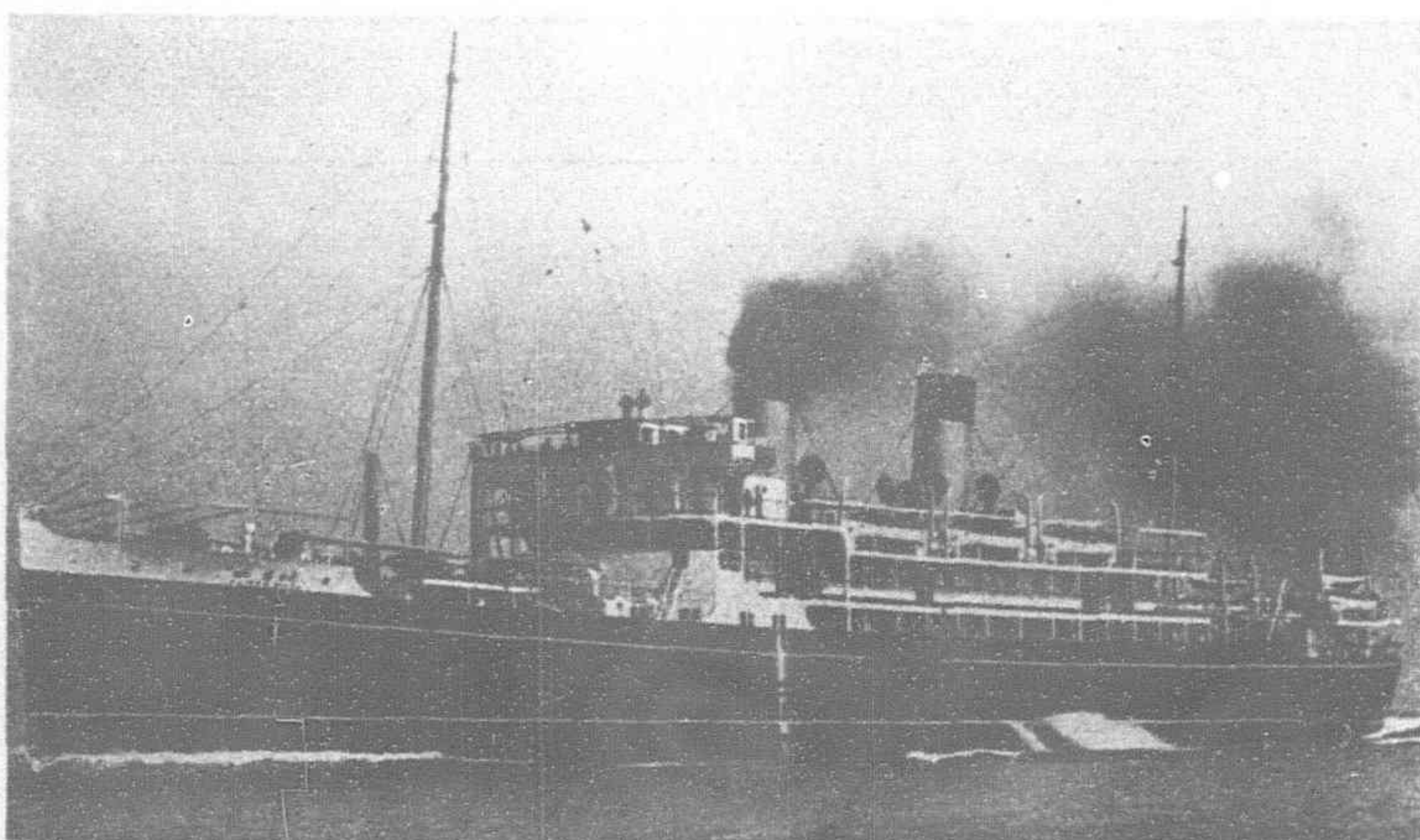
VESSELS.—Warships, such as battleships, battle-cruisers, cruisers, destroyers, flotilla depot ships, etc., mail passenger ships, passenger and cargo ships, cargo boats, oil tankers, cross-channel train ferries, cable ships and tugs, launches, trawlers, floating cranes, motor boats, etc.,

MACHINES FOR LAND AND MARINE PURPOSES.

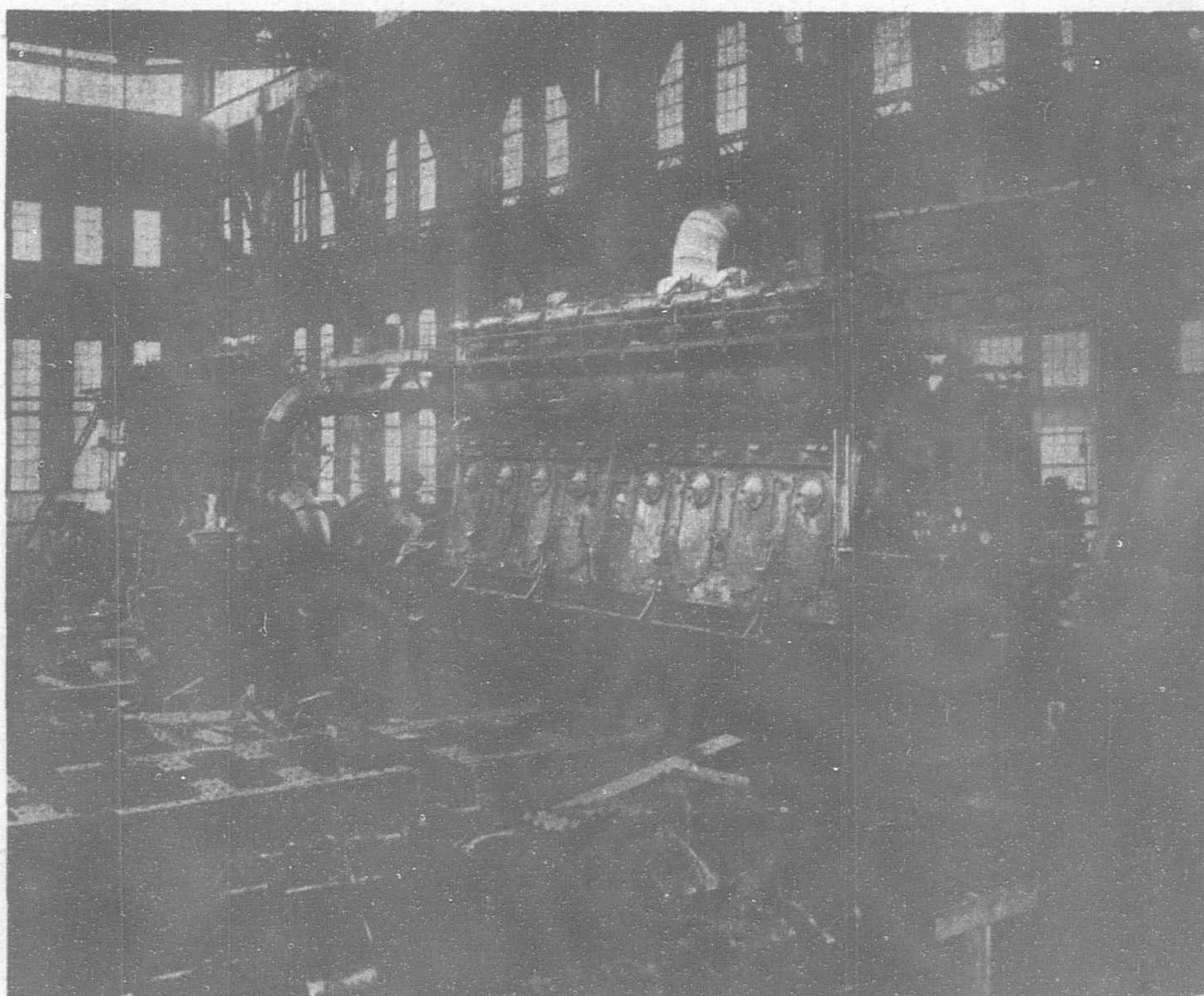
—Marine Diesel engines, land and marine steam turbines, speed reducing gears, steam reciprocating engines, water-tube and fire-tube boilers, pumps, auxiliary machinery.

STEEL AND OTHER CASTINGS AND FORGINGS, ELECTRICAL MACHINES, such as—Turbo-generators, dynamo engines, motor driven pumps, motor driven winches and windlasses, Ordnance fans, air compressors, etc.,

GIRDER AND FRAME STRUCTURES, ART METAL DOORS AND FURNITURE, ETC.,



Twin-screw Geared Turbine Passenger and Cargo Steam Ship
"Dairen Maru," Built at Kobe Works, Mitsubishi Zosen Kaisha,
to the Order of the Dairen Kisen Kaisha
Gross Tonnage, 3,748.19 tons. Speed, 17½ knots.



Main Engine of the "Asama Maru" 4 Sets of Mitsubishi Sulzer Diesel Engines,
Type 8 ST. 68, Developing Normal Output of 16,000 B.H.P. Each

Principal patents, licenses and other specialties owned by and manufactured in the works are as follows :—

Mitsubishi-Sulzer two-cycle marine Diesel engines.

Mitsubishi steam turbines for land and marine purposes

Mitsubishi-voelty land and marine steam turbines

Thornycroft high speed motor boats and launches

Motora's ship stabilizers

Sperry's ship stabilizers

Isherwood's system of ship construction

Contraflo condensing plant and kinetic air pumps

G. & J. Weir's condensing plant, pumps and auxiliary machinery

Mumford's pumps and contraflo auxiliary machinery

Ross-Schofield's circulators

Mitsubishi-Garbe water tube boilers

Nesdrum water tube boilers

Howden's forced draught apparatus

Esaki's steam superheaters

Kjellberg's electric welding process

Mitsubishi ordnance fans

N. M. Bronze

Iidaka's metal, etc.,

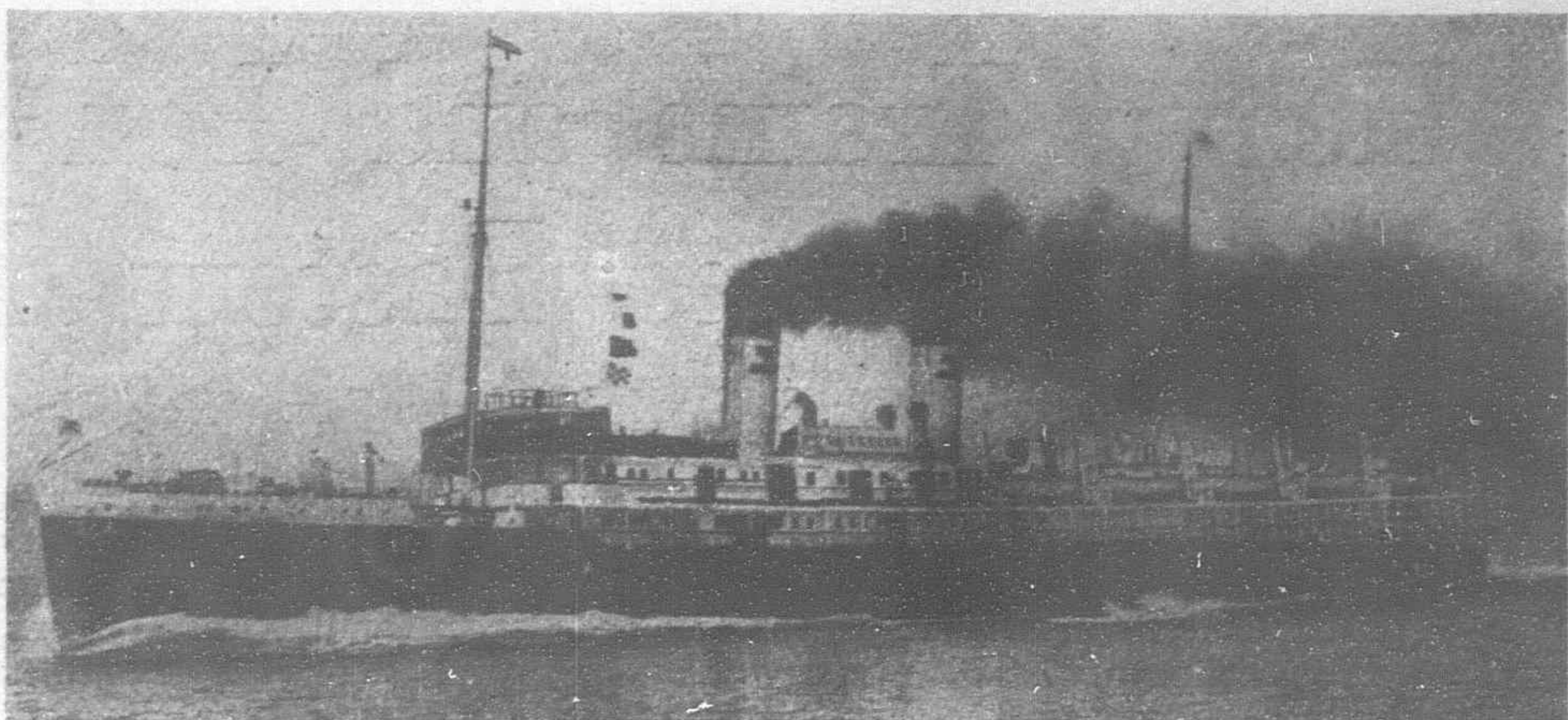
The undermentioned table, compiled up to the end of April 1929, showing the number of vessels built and engined at the works, illustrates what has been accomplished since the works entered upon this great enterprise.

MERCHANT VESSELS :

	Vessels.
1,000 tons gross and under 5,000 tons gross	41
5,000 tons gross and under 10,000 tons gross	59
10,000 tons gross and over	10
Total	110

WARSHIPS :

	Vessels.
Under 1,000 tons displacement ..	13
1,000 tons displ. and under 10,000 tons displ.	20
20,000 tons displ. and over ..	3
Total	36



Twin-screw Geared Turbine Passenger Steam Ship "Keifuku Maru," Built at Kobe Works, Mitsubishi Zosen Kaisha, to the Order of the Imperial Japanese Government Railway

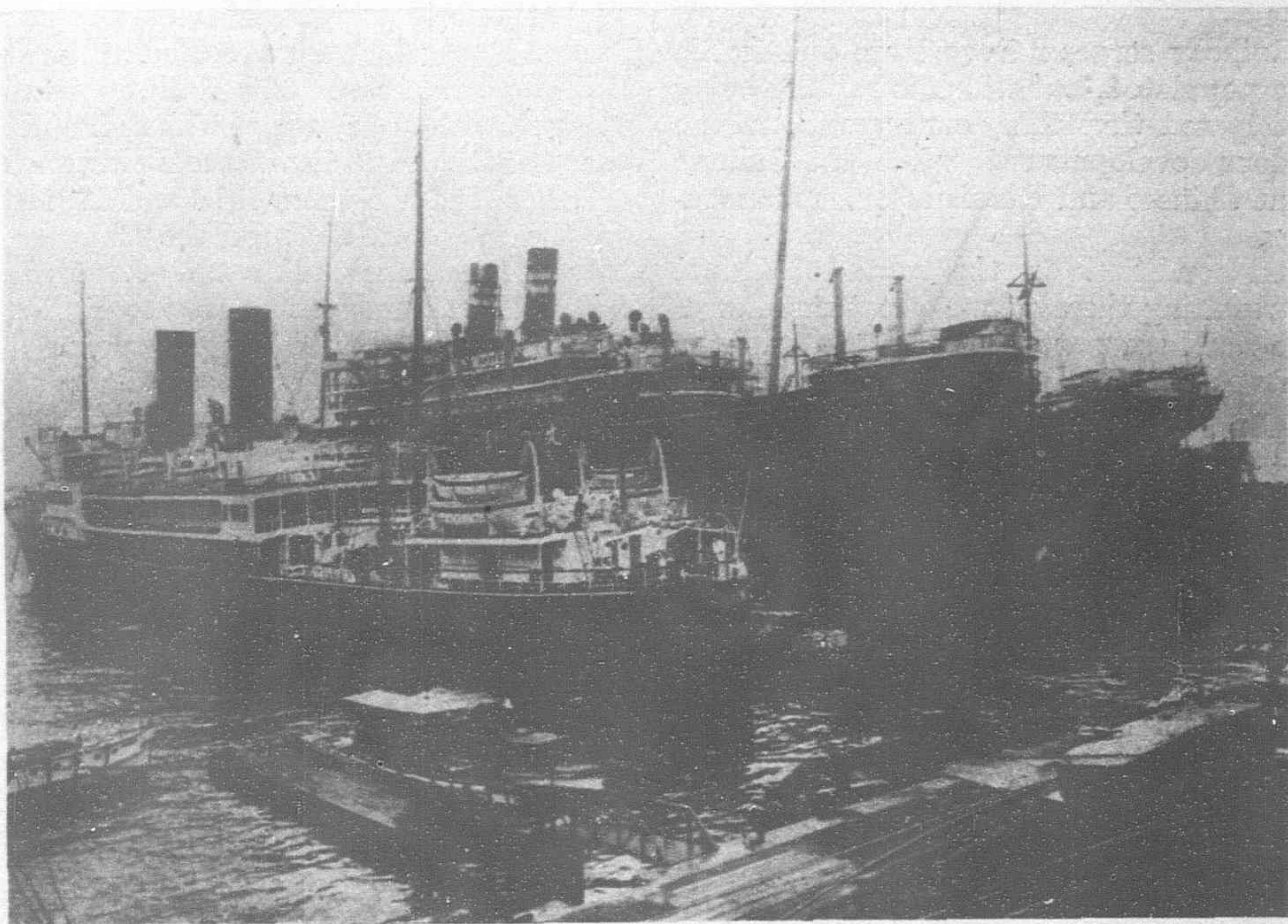
Gross Tonnage, 3,619.66 Tons. Speed, 20½ Knots.

(N. B. — Vessels of under 1,000 tons gross are excluded.)

Vessels under construction at the end of April 1929 :

Two Quadruple screw steel motor vessels (16,700 tons gross) for transpacific passenger service for Messrs. Nippon Yusen Kaisha.

Two Twin screw steel motor passenger and cargo vessels (9,500 tons gross) for South American service for Messrs. Osaka Shosen Kaisha.



Floating Docks Owned by Kobe Works, Mitsubishi Zosen Kaisha

	Floating Dock	Lifting Power	Length of Keel Block	Max. Length of Ship Taken	Max. Breadth of Ship Taken	Max. Draft of Ship Taken
One Single screw steel motor oil tanker	No. 1	7,000 Tons	387 ft.	460 ft.	56 ft.	22 ft.
	No. 2	12,000 "	505 "	580 "	66 "	26 "
	No. 3	16,000 "	411 "	470 "	98 "	30 "

(10,600 D.W.) for Messrs. Ogura Sekiyu Kaisha.

Two Twin screw steel motor passenger and cargo vessels (11,800 tons gross) for European service for Messrs. Nippon Yusen Kaisha.

Four Twin screw steel motor cargo vessels (9,700 tons D. W.) for Japan, New York service for Messrs. Osaka Shosen Kaisha.

N.B.—Vessels under 1,000 tons gross are not included. Warship is not dealt with.

Electric and Gas Undertakings in Korea

THE first electric enterprise in Chosen (Korea) was the building of a tramway in Keijo by a joint-stock company organized by an American citizen in 1899, and in 1901 it started the supply of light in addition. Similar works were started in Fusan in 1902 and in Jinsen in 1906, after which little progress was made, for at the time of union with Japan they still numbered but three, with an aggregate capital of Y. 3,300,000 and a capacity of 1,380 kilowatts. Since that year, however, steady growth has been witnessed in meeting the general increase in demand for electricity, and these undertakings in 1925 numbered 70 (of which 60 were in actual operation) with a total capital of Y. 92,000,000 and a capacity of 178,000 kilowatts. Besides, there were 13 official undertakings for government use and 59 private ones.

In Chosen, the electric undertakings so far established depend for the most part upon heat for their motive-power, so in 1911 the Government began to make a country-wide investigation of the water-power that might be utilized for generating electricity, and

completed it with respect to eleven of the larger rivers in 1914, discovering thereby 89 sites capable of producing 76,000 h.p., but as the feasibility of hydro-electric enterprises can only be determined after making long and close inquiry, a more detailed investigation was started in 1922, and the result so far obtained is that 54 of the 143 sites of promise, with a combined capacity of 1,164,000 h.p., are ascertained to be of easy and profitable management.

There are two gas-producing undertakings in Chosen, one at Keijo and the other at Fusan. The former started work in 1909 and the latter in 1915, and the year 1925 saw their capital standing at Y. 2,240,000 and their productive capacity at 189,910,000 cubic feet a year.

Control of gas was formerly exercised by the police authorities, but in view of the fact that the business is done as a side line by electric companies it was transferred in 1919 to the Communications Bureau so that both might be under the same supervision.

Heavy Trains and Long Runs on the Chinese Eastern Railways

By S. J. Kolpachnikoff in "Baldwin Locomotives."

THE Chinese Eastern Railway runs through the northern part of Manchuria starting from Manchouli Station on the border of Siberia, where it connects with the Trans-Baikalian Railway, and continuing to Harbin and Pogradichnaya where it connects with the Ussuri Railway leading to Vladivostok. The Chinese Eastern Railway, therefore, is practically a connecting link of the Trans-Siberian Railway, making a direct connection between Chita and Vladivostok. The length of its main line is approximately 850 miles and it also includes a branch line, approximately 140 miles long, which starts from Harbin and runs to Changchun where it connects with the South Manchuria Railway.

The Chinese Eastern Railway serves a very large and fertile country which is now thinly populated, but which is rapidly being colonized. It is to be anticipated that this country will, in the near future, have a tremendous development to which the Chinese Eastern Railway, under joint Chinese and Russian Soviet management, will contribute greatly.

Owing to the disturbed conditions in the south of China, constant wars and poverty resulting therefrom, a great number of colonists seek refuge in the northern part of Manchuria and the number of these immigrants is constantly increasing. It is difficult to obtain accurate figures, but it is estimated that half a million people have settled in this territory during the past spring and summer. The families which thus arrive start to work immediately to till the soil and the acreage of farm land is therefore increasing rapidly, which in turn increases the amount of freight handled by the Chinese Eastern Railway, at times taxing its capacity to the fullest extent.

It is interesting to note, therefore, how the management of the Chinese Eastern Railway is meeting this situation by introducing heavy trains and long locomotive runs.

The Chinese Eastern Railway is one of the few railways, built by the Russians, on which American locomotives were used extensively during the construction period. Between the years 1898 and 1903 the Railway purchased from The Baldwin Locomotive Works, 121 Consolidation type, Vaucrain Compound, locomotives and 27 0-6-2 type, Vaucrain Compound tank locomotives.

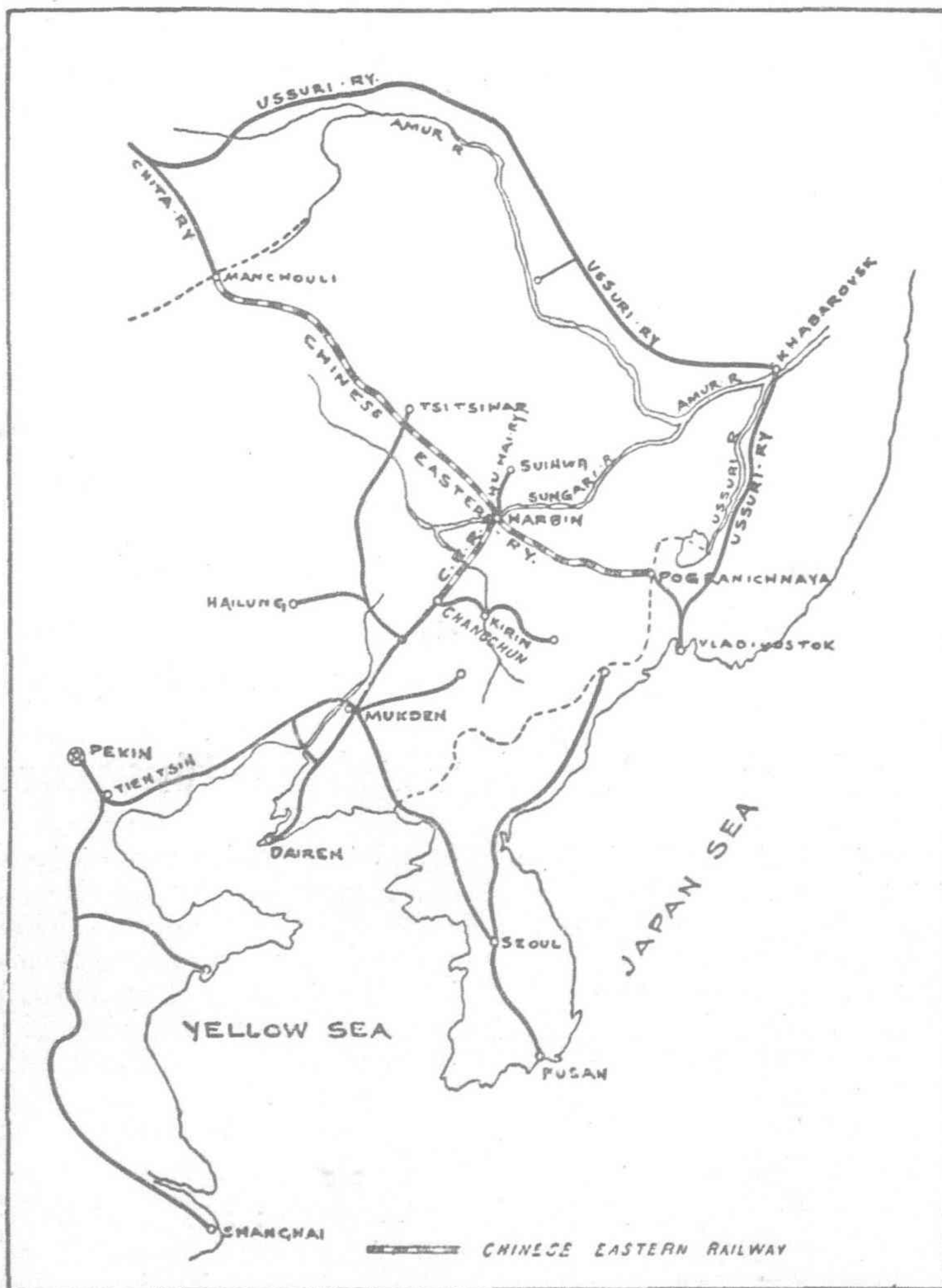
The tank engines performed their service faithfully during the construction work of the Railway and the Consolidation type locomotives, for a number of years, took care of all the freight movement on the Eastern Line of the Railway, which runs from Harbin to Pogradichnaya, a distance of 320 miles. This part of the line has heavy grades combined

with curves, quite a number of which go as high as 1½ per cent. where, of course, the trains are moved with the aid of pushers. Notwithstanding these severe conditions of operation, the Baldwin Consolidations have rendered very good service, especially during the period between 1914 and 1917, when a tremendous amount of freight, consisting largely of troops and war materials, was moved from Vladivostok and the Ussuri region to the front. As many as fourteen pairs of trains per day were handled during this period and the service of these veteran engines is still gratefully remembered by all the older employees of the Chinese Eastern Railway.

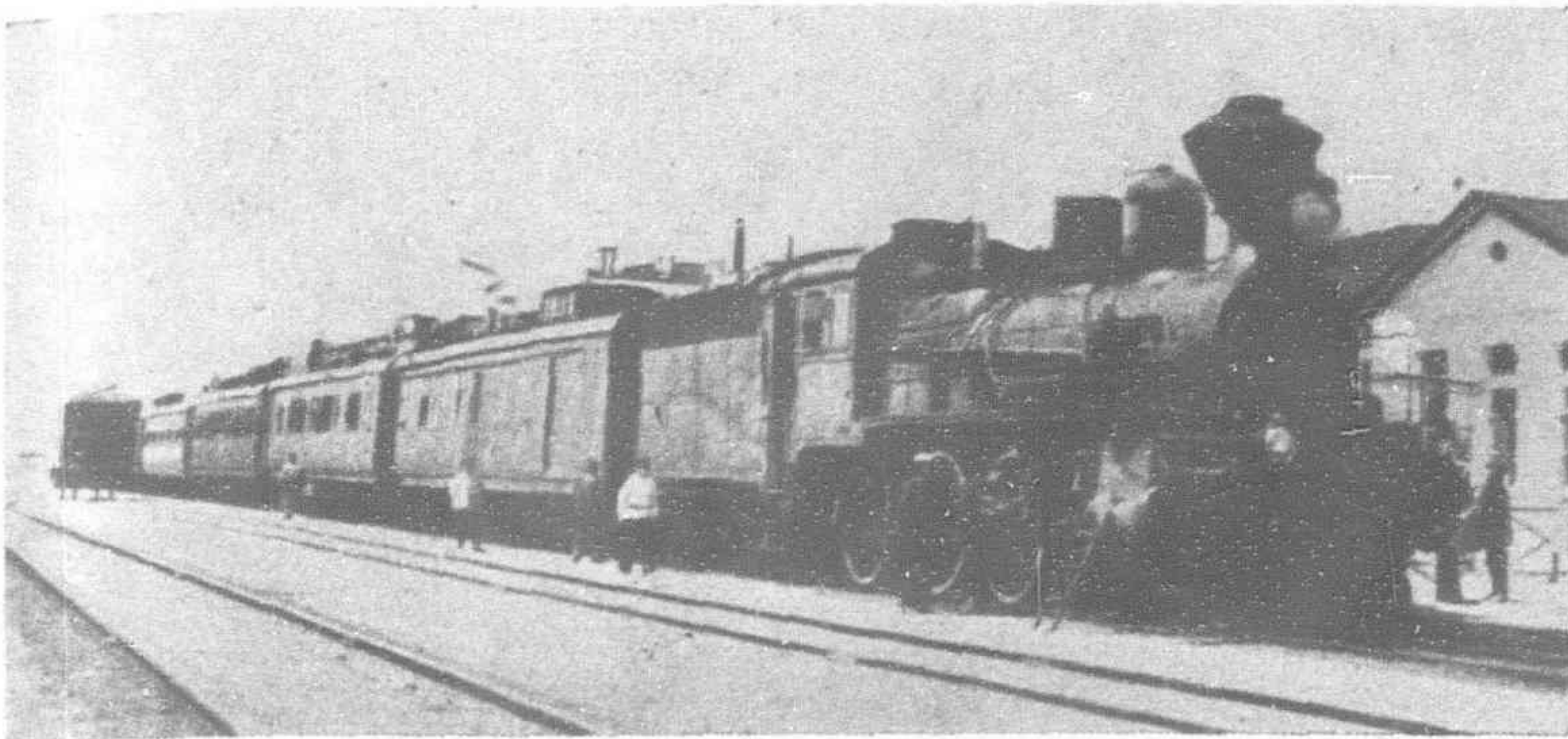
During the same period the Russian Government ordered approximately 900 Decapod type locomotives from the United States, all of which were erected in the shops of the Chinese Eastern Railway at Harbin. The Railway retained 114 of these Decapods, using them to take care of trains, the weight of which had gradually exceeded the capacity of the Baldwin Consolidations.

Between the years 1918 and 1921 these 114 engines were used on the Western Lines of the Chinese Eastern Railway between Harbin and Manchouli, a run of approximately 530 miles. Besides the Baldwin Consolidations, the Railway also had in operation a number of 2-8-0 type freight engines built by the Fives Lille in France, as well as a number built by the Russian Locomotive and Machine Works at Kharkoff and the Brianski Iron Works at Briansk. These Russian-built locomotives of the 2-8-0 type were designated as "Tze" and "Sha" locomotives. The passenger service was taken care of by "Gue" engines of the 4-6-0 type built by the same Russian works.

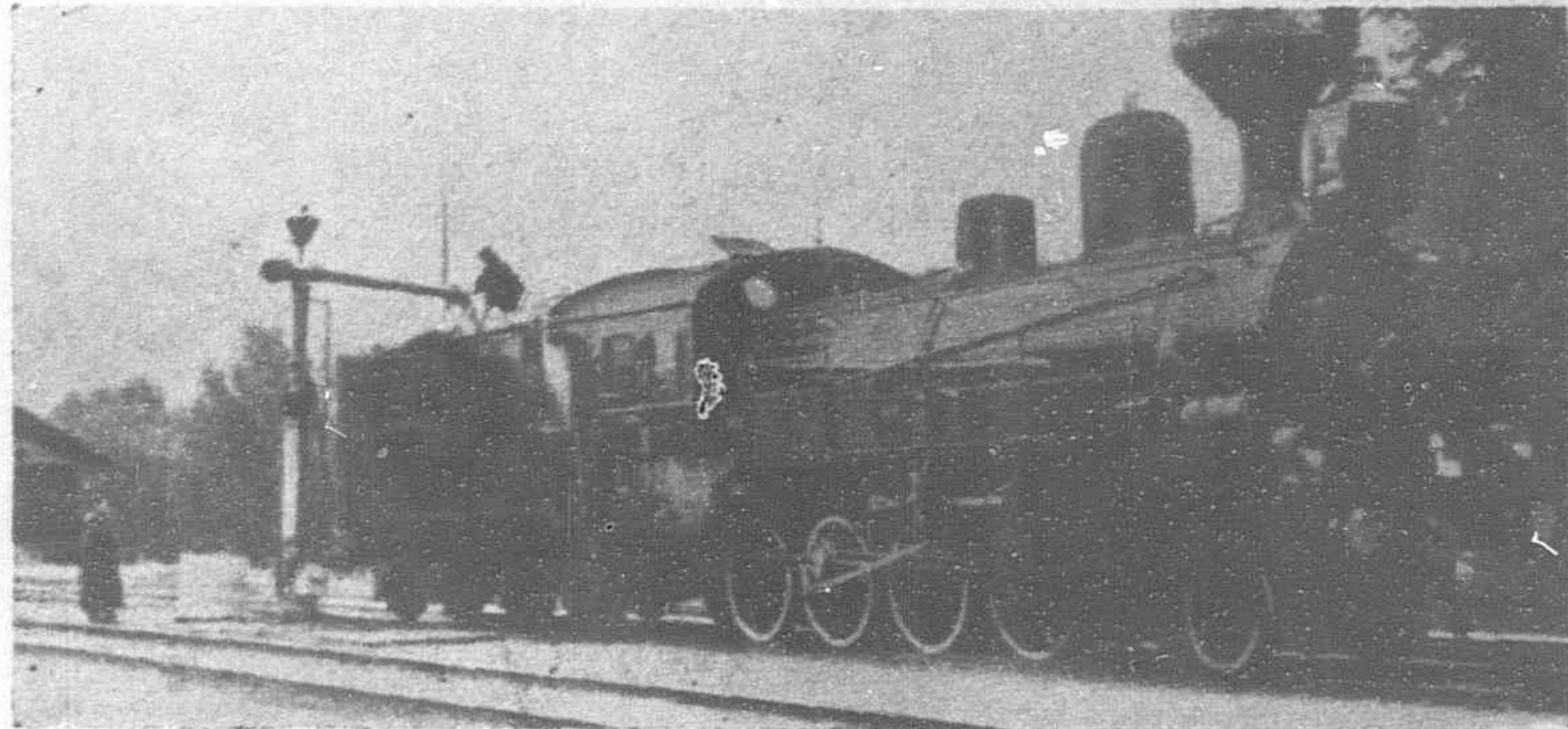
Even before 1920 the ever-increasing quantity of freight on the Chinese Eastern Railway, and the insufficient power of most of their locomotives, was causing great concern to the administration of the Railway. In 1920 a complete change was made in the executive personnel and a most capable Russian engineer, Mr. Ostroumoff, was appointed General Manager, and he devoted considerable attention to the problem of the rapidly increasing traffic. In 1921 the newly appointed Superintendent of Motive Power, Mr. Kalina, finally took active steps to remedy the situation. According to his plan of action the Decapod locomotives were immediately assigned to the most congested and difficult parts of the line, viz.: on the Eastern Lines from Harbin to Vladivostok and the Southern Lines from Harbin to Changchun, where the quantity of export freight had increased tremendously. In place of these Decapods other less powerful locomotives were assigned to the Western Lines, where the traffic was not so heavy. At that time the trains handled



Map of the Chinese Eastern Railway Showing its Connections with the South Manchuria Railway, the Chita Railway and the Ussuri Railway



The First Long Run Passenger Train Arriving in Manchouli from Harbin



Locomotive of the Consolidation Type Built in Russia for the Chinese Eastern Railway and Designated by the Russian Letter "TZE"

by the Decapod locomotives had a maximum weight of about 1,000 tons.

Having thus relieved the situation somewhat with the engines available, Mr. Kalina started to carry out a series of experiments with heavy trains, instructing the engine crews how best to handle these trains and how to keep all engines in good working condition. This hard and persistent work has started to produce results and every year the weight of the trains has gradually increased until, on some divisions, it reaches almost double the weight of the trains in 1921, when Mr. Kalina took over the duties of Superintendent of Motive Power. At present the weight of the freight trains which are handled by the Decapods is fixed at 90,000 poods (1,500 tons) on divisions of the road where the grades do not exceed 0.9 per cent. and at 135,000 poods (2,200 tons) on divisions where the grades do not exceed 0.7 per cent. On heavy grades up to 1.5 per cent. a second Decapod is used as a pusher.

When conducting his experiments with heavier trains Mr. Kalina, at the same time, was giving serious consideration to the possibility of increasing the length of locomotive runs. He foresaw that, notwithstanding the heavy trains, there would soon be a shortage of locomotives on account of the rapidly increasing freight traffic, and, therefore, experiments were carried on and preparations made to operate locomotives on long runs.

In the initial stages of this work, during 1922 and 1923, long runs were inaugurated with passenger trains, as it was considered that the engineers driving the locomotives of such trains were more experienced and careful. In order to be sure of his ground, Mr. Kalina progressed very carefully, extending the runs of locomotives to 220 miles instead of the previous distance of 136 miles. Experiments with long runs of freight engines were carried on at the same time.

It will be of interest to note that during this first period Mr. R. E. Bedford, erecting engineer of The Baldwin Locomotive Works, at that time visiting Harbin, took part in some of the first runs, giving information as to how experiments on long runs were conducted in the United States at that time.

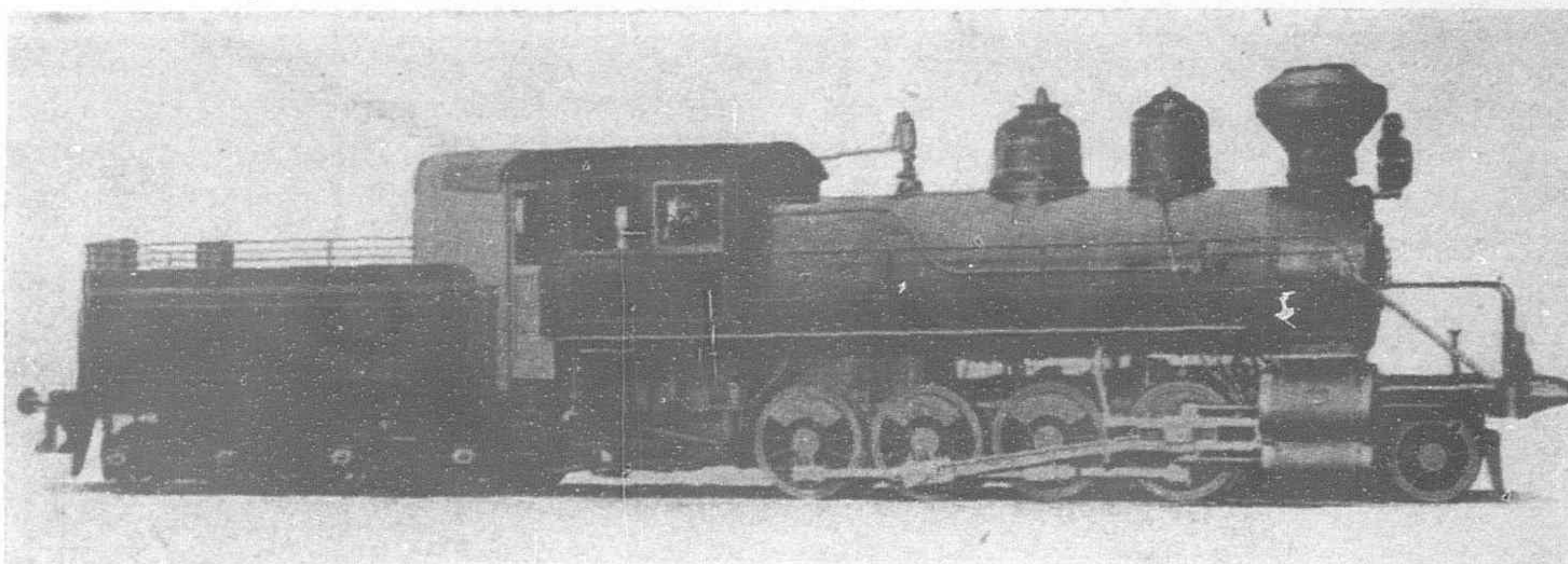
However, the question of long runs remained in its experimental stage until the winter of 1924, when Mr. A. N. Ivanoff, new General Manager of Chinese Eastern Railway, realizing to its full extent the important effect the long runs would have on the handling of freight, gave strong support to Mr. Kalina's projects.

Long locomotive runs were definitely put in force on May 1, 1925, for passenger trains and on November 1, 1925, for freight trains, which permitted the Railway to handle successfully the freight resulting from the bumper crops which occurred in the years 1925, 1926 and 1927, and the improved handling of this traffic netted the Railway a tremendous profit and enabled it to build up a large reserve fund.

The introduction of long runs on the Chinese Eastern Railway should be considered quite an accomplishment, as they met not only the usual difficulties which are encountered when introducing long runs in the United States, but also with exceptional difficulties on account of the idea which the Russian locomotive engineers have had for generations, that a locomotive should be assigned to the care of one man only. It is interesting to note

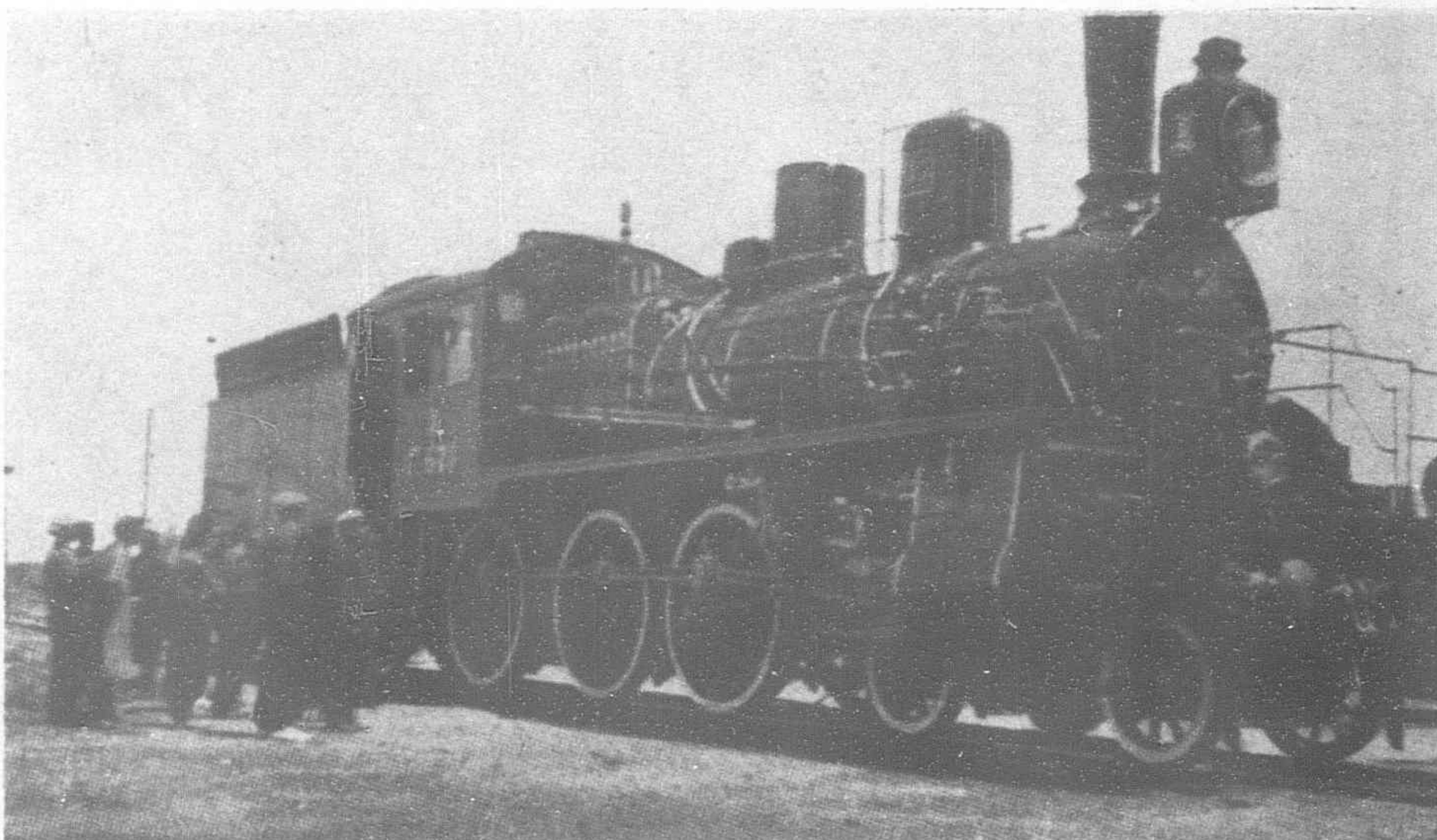
that even such a progressive man as Mr. Ostroumoff, when he was General Manager, considered the long runs a dangerous experiment and at one time ordered them to be discontinued.

Besides this antagonism and the usual technical difficulties, Mr. Kalina had also to convert the engine crews to his ideas, and this was only made possible by his energy, his knowledge of working conditions and the energetic support given to him by Mr. Ivanoff.



One of the 121 Vaucrain Compound, Consolidation Type Locomotives Purchased from The Baldwin Locomotive Works by the Chinese Eastern Railway in 1898

H. P. Cylinders	14-in. by 26-in.	Drivers, diam.	50-in.	Weight on drivers	125,000 lb.
L. P. "	24-in. by 26-in.	Steam pressure	180 lb.	" total engine	143,000 lb.



One of the Russian-built "GUE" Locomotives of the 4-6-0 Type Used in Passenger Service

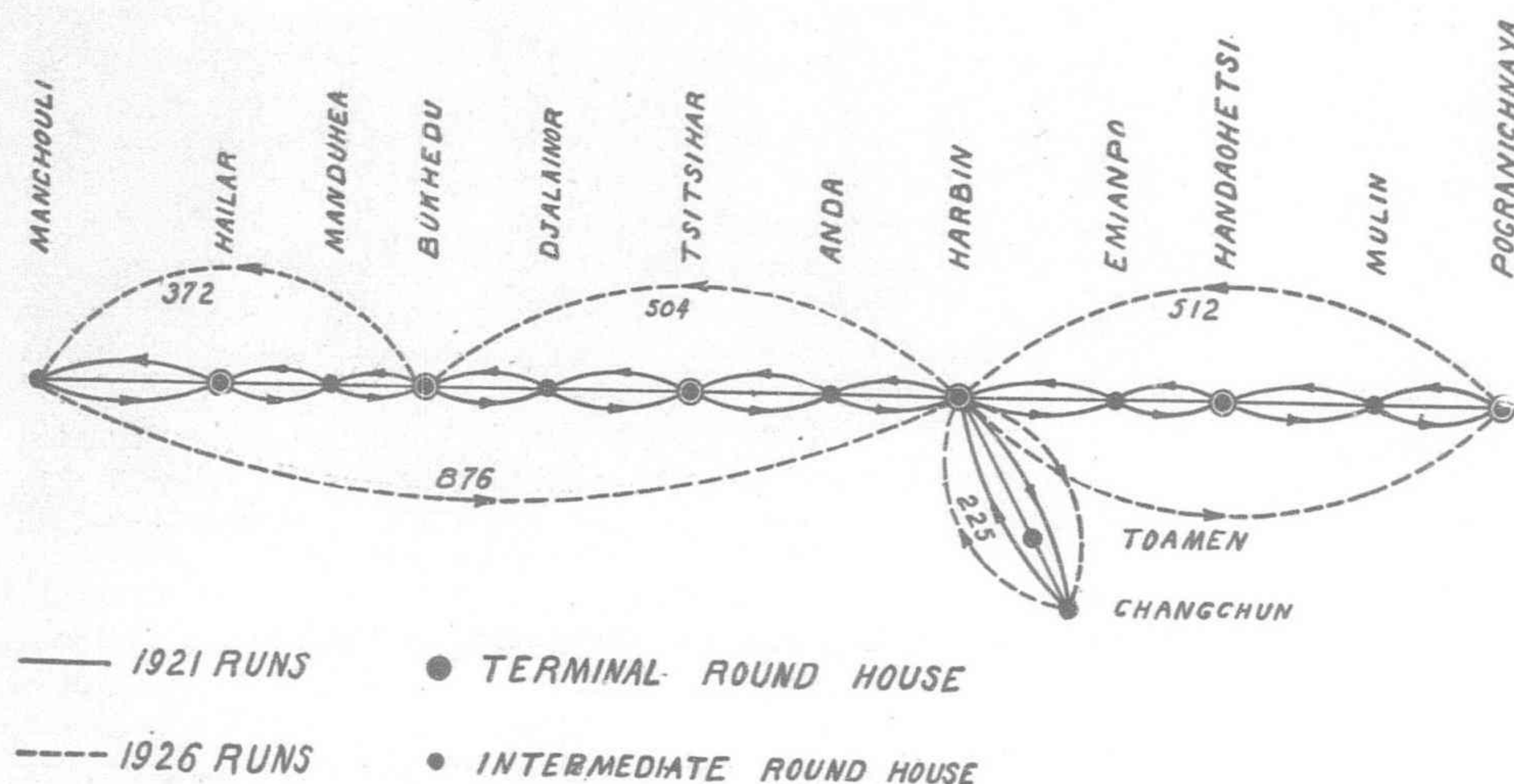


Chart Showing the Increase in the Length of Passenger Locomotive Runs Since 1921

The Figures on this Chart, and Chart at bottom of this page are Given in Kilometers. A Kilometer is Equal to Approximately Six-tenths of a Mile

This support has been continued by the latter's successor, Mr. Emshanoff, the present General Manager of the Chinese Eastern Railway.

As a result of this intensive effort long runs of locomotives have finally become the regular practice. On the Western Lines of the Chinese Eastern the passenger engines make continuous runs from Harbin to Manchouli, a distance of 530 miles, and the freight engines make runs of about 235 miles. On the Eastern Lines the longest passenger run is 307 miles and the longest freight run 154 miles. The diagrams illustrate clearly the increased length of the locomotive runs and indicate the location of the intermediate round-houses on the line. As a result of the adoption of long locomotive runs the mileage of passenger train engines has increased 44 per cent. and that of freight train engines 40 per cent.

At the time when the experiments were being conducted in connection with long runs, Mr. Kalina also gave much thought to improving and expediting the repairs of locomotives so as to make better use of the available power. To this end serious consideration was given to electric welding and the main shops of the Railway at Harbin were equipped with a Wilson electric welder of four-arc capacity, which permitted these shops to promptly take care of important repair jobs.

Furthermore, two welding machines of smaller capacity have been put in operation in roundhouses along the line, and a special portable gasoline engine unit was purchased and erected in a car. This permits of making urgent repairs wherever they are required along the line.

The schedule of major repairs to locomotives at the Harbin main shops has been considerably accelerated. In 1920 it took 200 days to carry out major repairs to a locomotive, but by the year 1922 Mr. Kalina had reduced this time to 120 days. The methods were constantly improved so that by 1925 major repairs were made in 45 days, and at the present time 22 days only are regularly allowed for overhauling a locomotive.

After the introduction of long runs quite a number of obsolete locomotives were taken out of service, leaving in operation the American

Decapods for heavy freight trains, "Gue" engines for passenger traffic and "Sha" engines for light freight traffic. This is a further means of expediting the turn-over of locomotives and reducing the cost of maintenance, as a smaller variety of spare parts are required.

In 1926 a National Boiler Washing Plant was installed at the roundhouse in Harbin, making it possible to wash out boilers within four hours' time, whereas the previous method of washing engines cold required not less than 30 hours. This reduction of 26 hours in the time required for washing a boiler has resulted in a great saving, as the locomotives are in operation and earning revenue for a greater percentage of the time.

Notwithstanding the results already obtained in improving the traffic by increasing train loads and introducing long locomotive runs, Mr. Kalina is giving constant thought to the possibility of further improvements and in order to increase the speed of freight trains, which had already reached the maximum weight, a booster was ordered from the Baldwin Locomotive Works

and one booster from the Skoda Works, both of which are being tried out in service. It is expected that the application of the booster will tend to increase the annual tonnage of freight moved by locomotives so equipped from 15 to 20 per cent.

It should be noted that the experiments with long locomotive runs were conducted by the Chinese Eastern Railway at the same time that similar experiments were being conducted by the railways of the United States and, although these investigations were entirely independent of each other, the long runs have given most satisfactory results in both countries.

Due to the careful selection and thorough training of engine and repair crews and the great attention given to the running repairs of cars as well as locomotives, the rolling stock of the Railway is now in much better condition than it has ever been before. The success which has attended the progressive policy of the Chinese Eastern Railway has been watched with considerable interest by other railways in China, including the South Manchuria, and it is believed that the example set by the Chinese Eastern will have an important effect on the future development of both the Russian and Chinese railways.

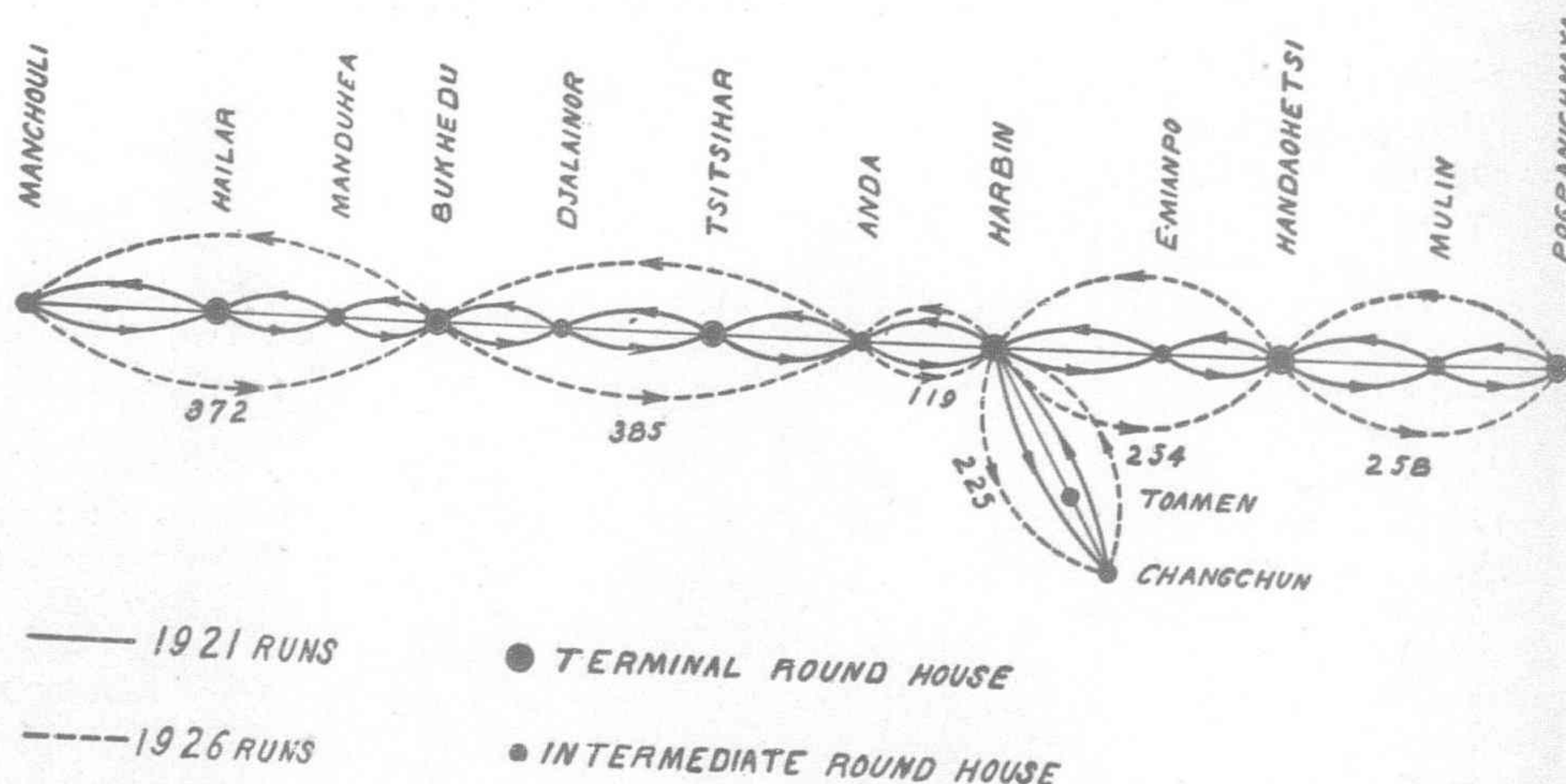


Chart Showing the Length of Freight Locomotive Runs To-day, as Compared with the Runs Made in 1921

New Japan Paraffin Co. in Manchuria

Managing-Director J. Honda of the new Japan Paraffin Co. which is affiliated with the South Manchuria Railway Co. in an interview with the *Manchuria Daily News*, said: "Not a piece of paraffin has yet been manufactured in Japan, while the annual demand reaches at least 20,000 tons. The new Company has

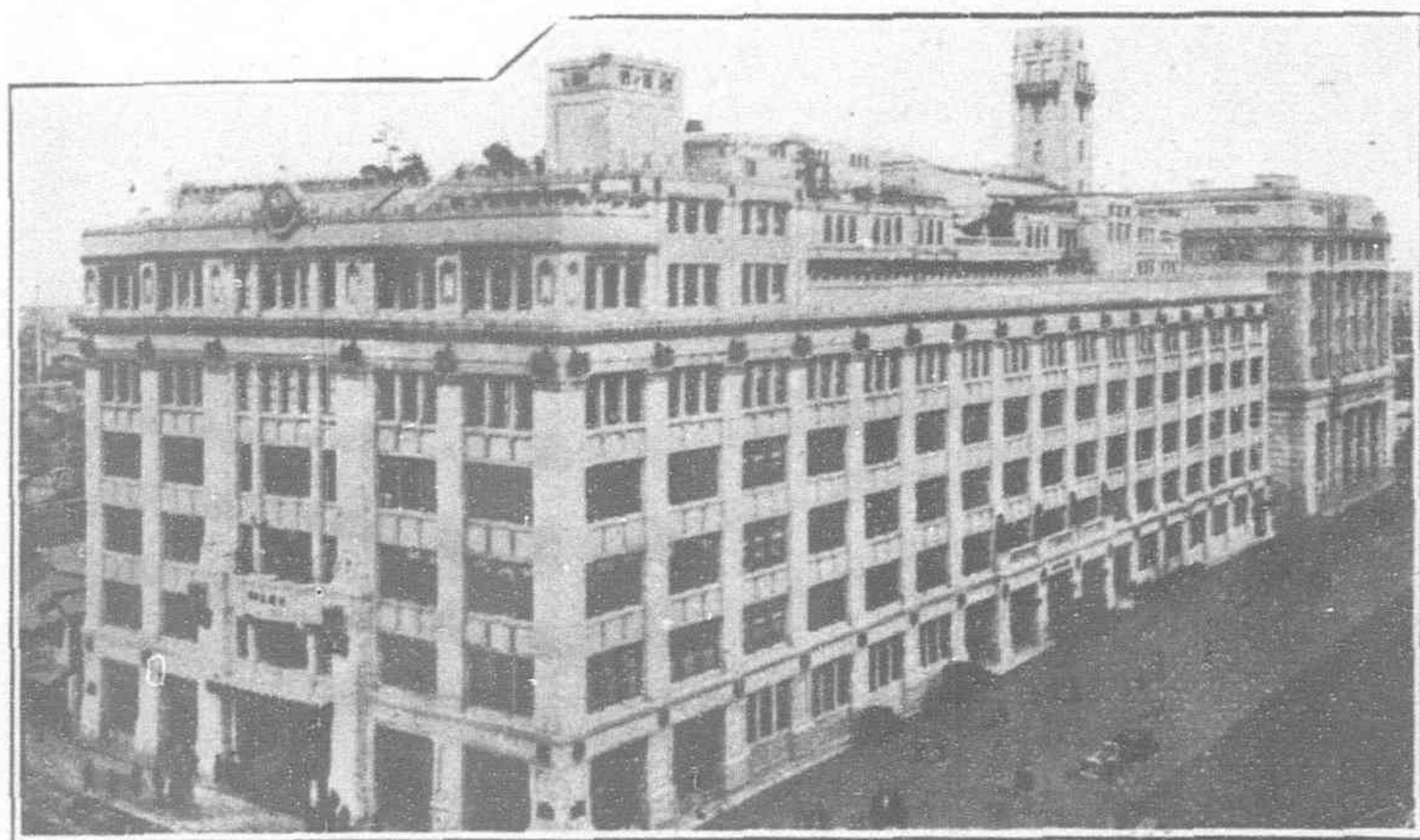
been brought into existence pressed by this need. The new factory is being got ready at Tokuyama, Suo Province, just round the corner from Shimonoseki. We expect to turn out 7,000-8,000 tons paraffin a year to start with. When the home demand is met, what surplus there will be found will be marketed in China."

Japan's Pioneer Department Store

MITSUKOSHI is the pioneer modern department store in Japan, though as such it is but a quarter of a century old. The store has behind it 255 years of business history, having developed from the original Echigoya.

The Echigoya was founded in the first years of Empo (1673) by Takatoshi Mitsui, the far-sighted founder of the colossal fortune of the present Mitsui Family. He hailed from the town of Matsuzaka in the province of Ise. He came to Yedo, the metropolis of Japan in the Tokugawa period. The name of the city was changed to Tokyo in 1868 when the Tokugawa Shogunate was overthrown and the Emperor Meiji made it the capital instead of Kyoto.

The Echigoya was first located in late Honcho Street and no doubt it was just a modest store. But it proved a success from the beginning and ten years later moved to Suruga-cho Street, where the Mitsukoshi now stands. It is remarkable to find a store on the same spot after 255 years of vicissitudes.



Mitsukoshi Department Store, Tokyo

Simultaneously with the removal, the Echigoya inaugurated the remarkable feature of marking the price in plain figures on every article, and sold it for cash. This one-price system was a great innovation in Japan in those days, and no doubt it helped the store to grow. John Wanamaker and Marshall Field adopted the one-price policy in their respective stores, but it was after the middle of the nineteenth century. A merchant in a southern city in America says that even as late as 1890, dry goods stores in his town used to mark three prices on the tags, the first the cost, the second the highest price that the store desired to realize, and the third the lowest price that could be accepted when the customer haggled. So it seems that the Echigoya was the pioneer in the one-price system.

The Echigoya enjoyed increasing and unbroken prosperity as part of the Mitsui enterprises, and in 1893 its name was altered to Mitsui Gofukuten. For certain reasons the Mitsui family relinquished the management of this "Gofukuten" in 1904 and the Mitsukoshi Gofukuten, Ltd., was organized and took over this historic store. With Mr. Osuke Hibi as its managing director, the Mitsukoshi started the present form of department store, although on a small scale at the start. Until that time a department store was unknown in Japan, as under the Echigoya and Mitsui Gofukuten régimes the store dealt only in piece goods, and not ready-made clothes, though it did accept orders for them.

The original capital of the Mitsukoshi was only Y.500,000. In 1908 it was increased to Y.1,000,000 and branch stores were opened in Osaka and Keijo (Seoul) in Kores. The Dairen branch was inaugurated in 1909. In the following year the capital was again augmented to Y.4,000,000 and in 1917 it was made Y.6,000,000. The year 1919 saw the capital increased to Yen 12,000,000.

The Mitsukoshi sustained a severe blow from the great earthquake fire of 1923. The damage from the earthquake itself was not so serious as from the subsequent fire. The fact that even the framework alone was saved was lucky for the Mitsukoshi, because it facilitated reconstruction work.

The undaunted management lost no time to meet the situation. The stricken citizens of Tokyo had to be supplied with the necessities of life as soon as possible. A temporary wooden shed was hurriedly

erected in the gutted building. Merchandise was stocked with the utmost speed and the store was opened to business within six weeks after the holocaust.

Before long temporary repairs to the old building enabled one-half of the first two floors to be used as sales rooms, and little by little the sales space was extended.

In order to serve more satisfactorily the Tokyo residents who were in desperate need of goods, eight Mitsukoshi branches were opened in important districts of the city and thus the store's patronage was retained. These stores, however, were abandoned one after another, as the repair work on the old building progressed and its sales rooms were enlarged. But the Shinjuku Branch was retained and moved to a better quarter in the neighborhood, as it was originally intended as a permanent feature in that fast growing uptown district.

In the meantime, the thorough repair of the old building was pushed on rapidly and systematically at a great cost, much higher than the whole cost of the original building. Work on the permanent repair was started on October 1, 1924, at one side at a time, so as to cause to business as little dislocation as possible, and by September, 1925, the western section was completed. By June, 1926, the central section was finished. In March 31, 1927 the remaining section was completed and the entire building was formally reopened to the public on April 7 the same year.

The following data in connection with the great repair work is of interest:

911 days were required, the equivalent labour of 23,000 workmen, and using 770 tons of steel frames, 1,400 tons of reinforcing steel bars, 34,000 kegs of cement, 14,800 cubic yards of concrete, 12,000 cubic feet of granite, 107,000 square feet of marble, 990,000 facing bricks, etc.

Thus the present Mitsukoshi main store is constructed of steel reinforced with concrete, the brick walls of the old building having been entirely removed, and it is to-day thoroughly earthquake proof.

When the old building was denuded by fire, things looked very gloomy. And the management of Mitsukoshi must have expected a certain period of no dividends. The capital was reduced almost by one-half, but soon it was augmented to Yen 15,000,000.

Fortunately the rehabilitation of Tokyo after the catastrophe was so quick and effective that it did not take very long for the organization to declare the pre-earthquake rate of dividend, i.e. 15 per cent. per annum. Despite the general depression, the Mitsukoshi is now enjoying prosperity almost unparalleled with an ever increasing volume of business which probably ranks high among the department stores of the world.

The pay-roll of the Mitsukoshi comprises about 7,000 persons of whom over 4,000 are employed by the Tokyo main store. Visitors to the store average about 60,000 daily and on Sundays and national holidays they reach over 200,000.

Besides the Shinjuku Branch in Tokyo, the Mitsukoshi now maintains branch stores in Osaka, Kobe, Seoul and Dairen. Branch offices are in Kyoto and Kiryu, but these are confined to purchasing materials in those great weaving centers for sale in the other stores.

The present main building of the Mitsukoshi in Tokyo has a tower rising 200 feet from the ground and the building of seven stories rises 100 feet. The total floor space of this building covers 360,000 square feet, and when the present plan of extension is completed the total floor space will increase to something like 640,000 square feet.

The Board of the Mitsukoshi Corporation is composed of the following officers:

Chairman of the Board of Directors:

Mr. Masao Kurachi.

Senior Managing Director:

Mr. Kyutaro Oda.

Junior Managing Director:

Mr. Seishi Aso.

Mr. Kuraji Kitada.

Mr. Hisashi Kido.

Director: Mr. Rikitaro Nakamura.

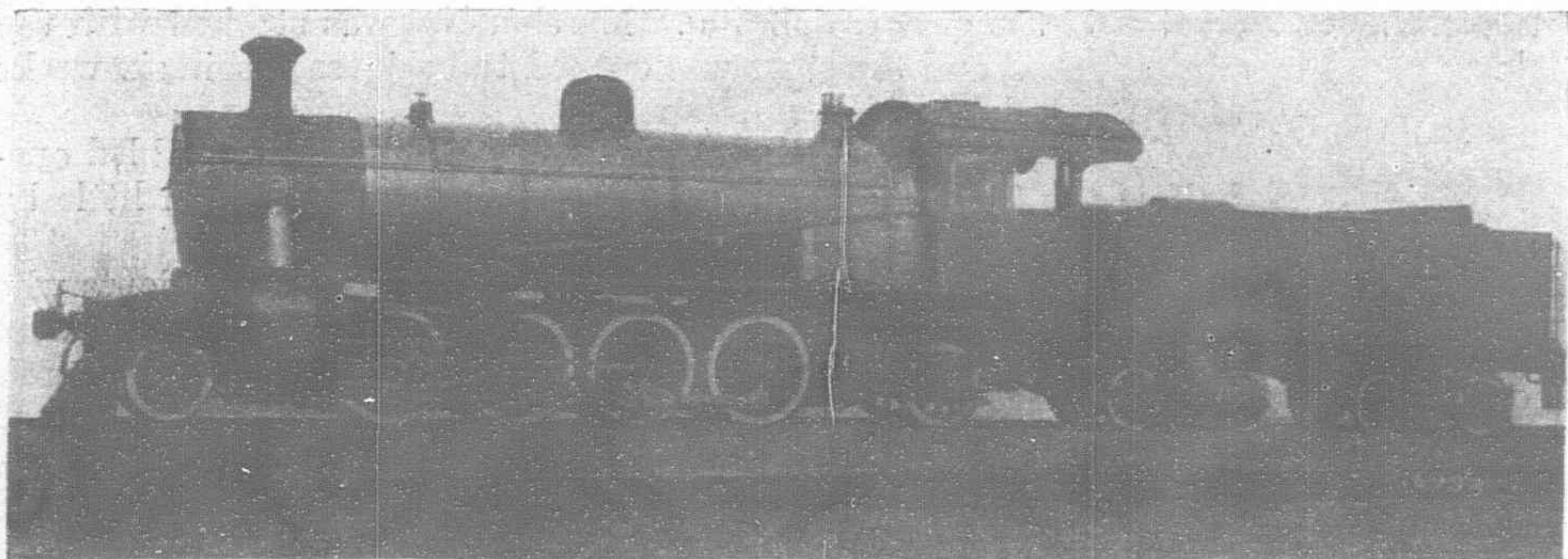
" Mr. Tsunekichi Asabuki.

" Mr. Shiro Hamada

Auditor: Mr. Umeshiro Suzuki.

" Mr. Sotaro Yanagi.

" Mr. Ichizo Hayashi.



Mikado Type of Baldwin Locomotive

10 Baldwin Locomotives for China's Railways

ANDERSEN, MEYER & COMPANY have contracted to sell 10 Baldwin locomotives of the Mikado Type to the Ministry of Railways for the use of the Tientsin-Pukow line. The contract was signed by Mr. V. Meyer on behalf of Andersen, Meyer & Company and Mr. Sun Fo, Minister of Railways on behalf of the Government.

The following are the specifications :

Gauge of Track	..	..	..	4-ft. 8½-in.
Cylinder Diameter	..	..	..	20-in.
Cylinder Stroke	..	..	..	28-in.
Driving Wheel Diameter	..	..	..	54-in.

Wheel Base Driving Rigid	..	..	15-ft. 0-in.
Engine only	..	..	31-ft. 10-in.
Engine and Tender	..	..	59-ft. 3-in.
Boiler Diameter	..	..	72-in.
Boiler Pressure	..	..	200 lbs. per sq. inch
Fire Box Length	..	..	96½-in.
Fire Box Width	..	..	65½-in.
Tubes, Number	..	..	139 2-in. dia.) 16-ft. Long
Flues Number	..	..	24 5½-in. dia.)
Arch Tubes Number	..	..	4
Arch Tubes Diameter	..	..	3-in.
Heating Surface Tubes	..	..	1,176 sq. ft.
Heating Surface Flues	..	..	546 "
Heating Surface Arch Tubes	..	..	18 "
Heating Surface Fire Box	..	..	192 "
Heating Surface Total	..	..	1,932 "
Superheating Surface	..	..	464 "
Grate Area	..	..	43.5 sq. ft.
Weight in Working order approximate—			
Truck	..	..	19,836 lbs.
Drivers	..	..	140,000 "
Trailer	..	..	34,493 "
Engine	..	..	194,329 "
Tender	..	..	124,150 "
Total Engine and Tender	..	..	318,480 "
Traction Power	..	..	35,300 "
Tender Capacity—			
Water	..	..	5,289 Imp. Gallons
Coal	..	..	22,040 lbs.
Height above rail smoke stack	..	..	15-ft. 0-in.

New Buildings in Shanghai

(Continued from page 216).

building. This financial feat was accomplished with the help of E. Busch, architect, who is also responsible designing and supervising the construction of the new building. Since it was necessary for the architect to make his design conform to a narrow budget, the structure, while most modern, is plain both in its architecture and its mechanical equipment.

On the ground and first floors are 12 class rooms, an assembly hall, rooms for the head master and teachers and a spacious kindergarten. Nine of the class rooms face south and the drawing room and laboratory face north. These two first floors are entirely separated from the rest of the building.

The second floor contains apartments for the head master and teachers and on the top floor are apartments which will be rented, preferably to German families having children in the school.

The general contractor for the German school is Sun Nee Kee. A. Quoika is the contractor for the heating, plumbing and sanitary installations and the Eastern Industrial Electric Co. for the electrical equipment. Otis elevators are being provided by the American Trading Co.

The Cathedral School on Kiukiang Road, which is now under construction, is being built through the Henry Lester endowment. It will be one of the most modern and carefully planned school buildings in the Far East, rivalling those of England and Europe. Provision is being made for academic, scientific, fine arts and athletic work and recreation. Besides the regular class rooms and laboratories, there will be a covered playground, gymnasium, library, music room, scout and cub rooms, assembly hall large enough to seat 500 people and a tiffin room for the students. On the third floor there will be flats for the sub-dean and school master. It will be possible to care for 300 pupils in the school.

The ground floor of the building will be used as the Cathedral Church House. It will contain church club rooms and offices for societies.

The style of the building is Gothic. Reinforced, fire-proof concrete is being used in its construction with a finish of brick facing and artificial stone. A special ventilation system is being installed.

Palmer & Turner are the architects; the contractors are

Kung Kee for general construction, Scott, Harding for electric lights and lifts, the Shanghai Waterworks Co. for plumbing and heating and Crittal & Co. for the steel windows.

Automatic Converter at Ueno Station of the Tokyo Underground Railway

(Continued from page 212).

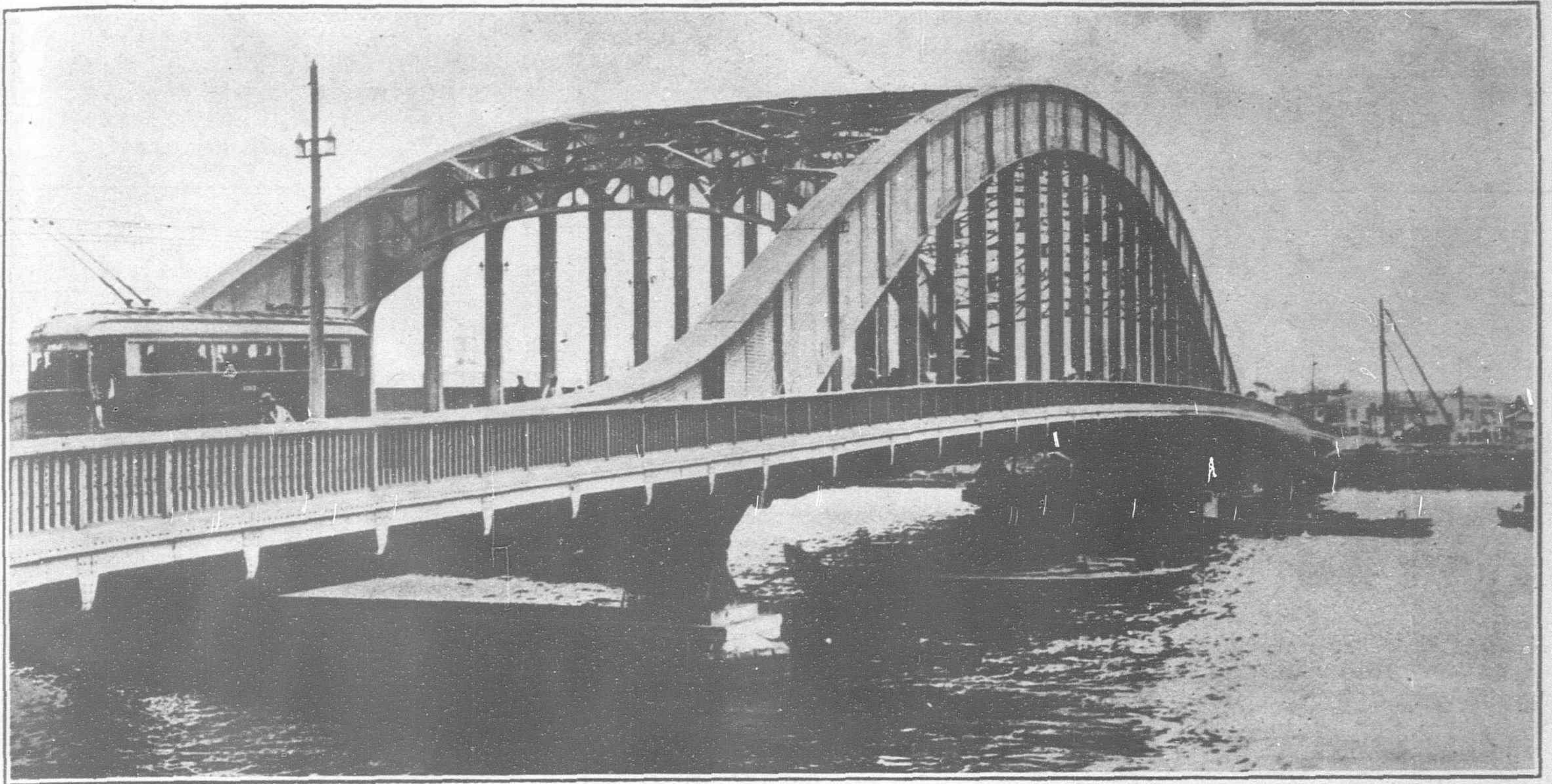
The converters are fitted with a centrifugal switch which acts upon the tripping mechanism of the direct current automatic circuit breakers. The bearing liners are equipped with temperature relays, Fig. 13. If one of these thermostats causes the machines to shut down, then the re-starting equipment is interlocked until the respective bearing has cooled sufficiently. The exciter voltage relay, in conjunction with the master controller, shuts down the machine if the auxiliary excitation fails during the starting period.

The starting period of the converters is controlled by time relays. If the machines are not ready for operation within the prescribed time, the oil circuit breaker opens automatically, whereupon the machines must be started up anew.

Other interesting details, which have yet to be mentioned, are that the D.C. reverse current relays are designed as contact-ammeters, whilst the interpole windings of the converters are used as shunt resistances. Drop-disc relays with current windings are provided for the individual trip circuits, so that the switchboard attendant may immediately ascertain from the inscription on the respective disc, what was the reason for release and then act accordingly.

As may be deduced from the above, the method of starting a rotary converter, which is all in all somewhat complicated, is so simplified by the inclusion of a few auxiliary devices that its control can be effected perfectly reliably even by unskilled personnel. Faulty switching, which is to be particularly feared at times of disturbance is averted, so that a high degree of service reliability obtains

The plant has now been in operation a year and has fully satisfied all anticipations, with the result that the railway management at Tokyo intend shortly to carry out further extensions adapting the identical means of control.



EITAI-BASHI, TOKYO: This structure, one of the most noteworthy of the new bridges across the Sumida River, has a central span of 330 feet, a total length of 600 feet and a width of more than 72 feet. It is an arch bridge with suspended roadway. Horizontal reactions are cared for by tie-rods at the bottom. The bridge has cantilever side spans and stands on pneumatic caissons, the deepest of which is nearly 90 feet below low water. The structure contains 4,900 tons of steel and cost Y.2,800,000. It has a considerable factor of safety against earthquake forces. The Foundation Company of America rendered notable service in supervising the construction of the caissons and piers. The rest of the work was done by Japanese contractors.

Bridges in Tokyo and Yokohama

THE earthquake did much damage to the bridges of Tokyo and Yokohama. In 1922 there were 583 bridges in the city of Tokyo, classified as follows: Steel construction, 47; stone construction, 189; wooden construction, 347. There were in addition, 309 small bridges, most of them wooden, which were classified as private bridges.

Of the 583 city bridges, 69 were shaken down by the earthquake shocks and 289 were destroyed by the ensuing fire. The destruction of these bridges seriously hindered communication and transportation at a most critical time and seriously impeded the rescue of those trapped by the flames. Many of the steel bridges had wooden floors; this proved to be a fatal defect, causing the destruction of bridges which would otherwise have remained undamaged.

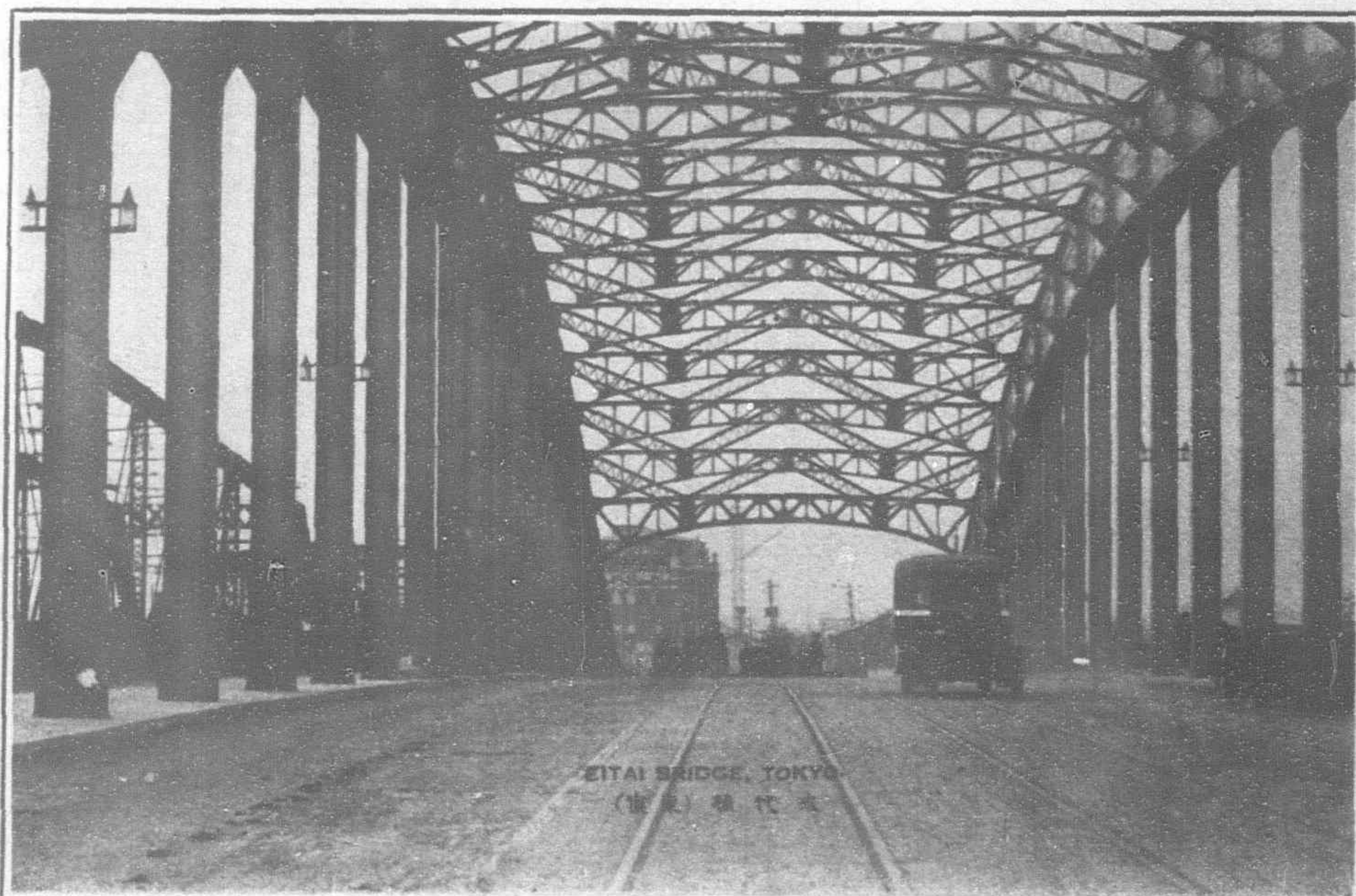
As a result of the lessons learned through the calamity the bridge-building program was realized to be a vital part of

reconstruction work and an essential to any system providing for safety during similar emergencies in the future. The first consideration in bridge design was obviously that of safety against fire and earthquake damage; the second was that of esthetic appearance, in view of the efforts being made to create in Tokyo a model imperial capital. These two considerations were given due prominence in the program for bridge construction undertaken

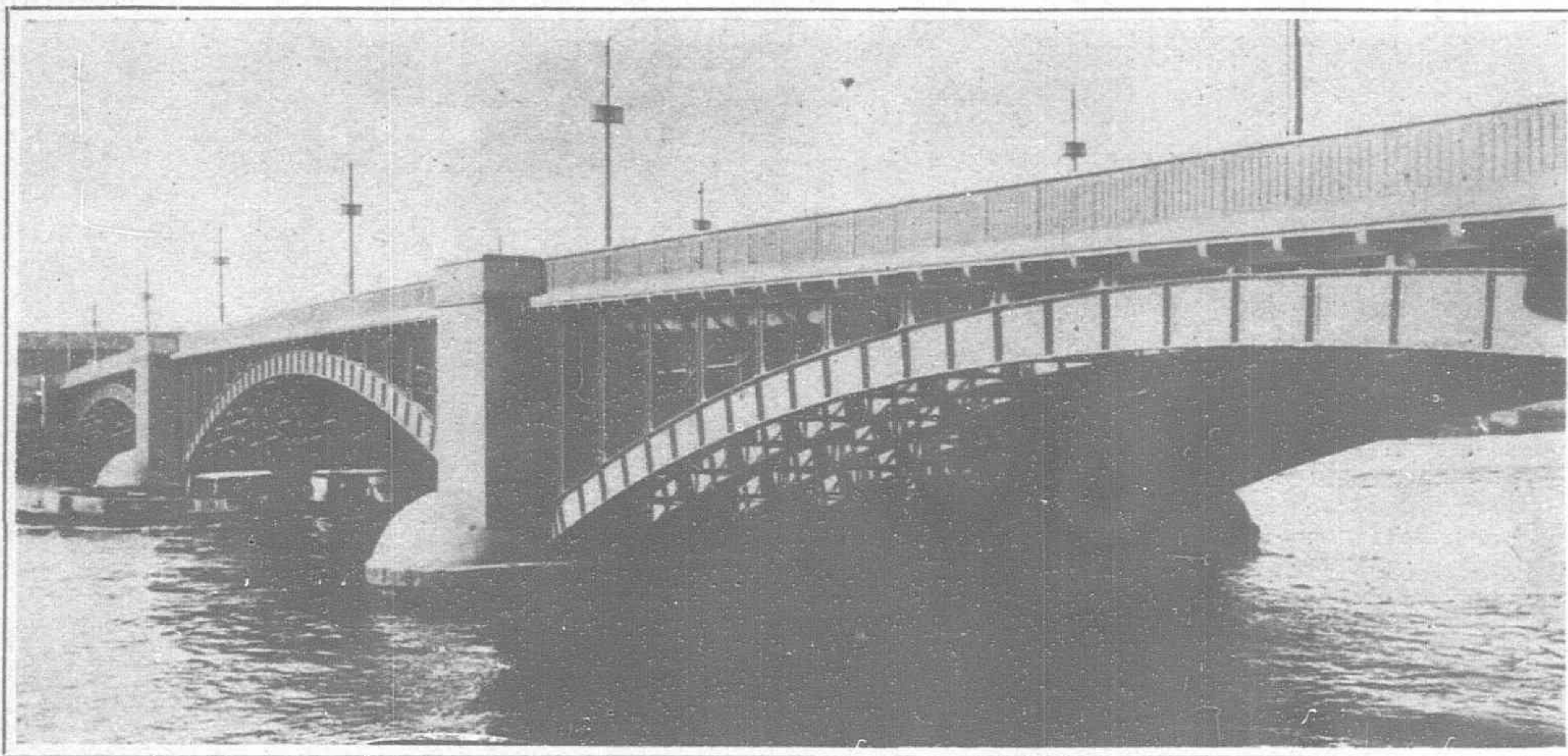
by the National Government and the municipalities.

The new program being carried out by the Reconstruction Bureau includes 97 main bridges, in addition to 21 bridges over canals and one bridge in connection with land-adjustment work. Besides these, 308 bridges are to be constructed by the city of Tokyo.

In Yokohama 27 new bridges are to be built by the Reconstruction Bureau and 13 damaged bridges are to be reconstructed. In addition the city of Yokohama will undertake the



EITAI-BASHI, TOKYO: View of Roadway, Through Center of Bridge



THE KURAMAI-BASHI: This two-hinged arch bridge which spans the Sumida River at Tokyo has a total length 503 feet with 167 feet spans. The cost of construction was Y.1,600,000. This type of bridge shows great resistance to earthquake shocks and is considered very satisfactory for the Tokyo District

construction of 29 bridges. Most of the bridge work is carried out in conjunction with street construction and the money allotted for this purpose is included in the allotments shown for street work.

Of the Tokyo bridges six of major importance will span the Sumida River, which runs through the heart of the city of Tokyo. Details of these six most important bridges are shown in the following table:

Name	Cost	Length	Length of max-imum span	Type	Foundation	Ap-proxi-mate depth of foundation	Ton-nage of steel
Aioi-bashi	Yen 1,600,000	Feet 434	Feet 70	Deck; plate girder; cantilever.	Pile	Feet 10	1,100
Eitai-bashi	2,800,000	600	330	Through arch with tie-rods and cantilevered side spans.	Pneumatic caissons.	80	4,052
Kiyosu-bashi.	2,500,000	600	300	Suspension; manganese-steel eyebars.	....do....	87	4,300
Kuramae-bashi.	1,600,000	507	167	Deck; two-hinged arch.	Caisson and pile.	24	2,200
Komagata-bashi.	1,800,000	483	245	Two-hinged arch, through.	Pile	13	2,000
Kototoi-bashi.	2,000,000	525	220.5	Deck; plate girder; cantilever.	Open caisson	68	2,600

These bridges are 18 feet above the average water level of Tokyo Bay and the width of each is 22 meters (72 feet 2 $\frac{1}{8}$ inches). The roadway is approximately 54 feet 6 inches in width, and the two sidewalks each 8 feet 10 inches. The bridges are designed to carry the loads resulting from trolley car, automobile, and pedestrian traffic as found under modern conditions, with an allowance for earthquake forces acting horizontally and vertically. The horizontal acceleration is assumed to be one-third of the acceleration due to gravity. It is estimated that the total excess of steel in the structures due to earthquake-proof construction is about 10 per cent. over that required for similar structures without earthquake-proofing. Two-hinged arches have withstood earthquake shocks very satisfactorily in the past, and this type is a favorite for use in this vicinity. Small two-hinged arches are often used on foundations resting on piles, and in many cases where foundation conditions would dictate the use of other types of structure in the United States.

Of these six bridges across the Sumaid River, the Aioi-bashi, Eitai-bashi, and Komogata-bashi have been completed, and

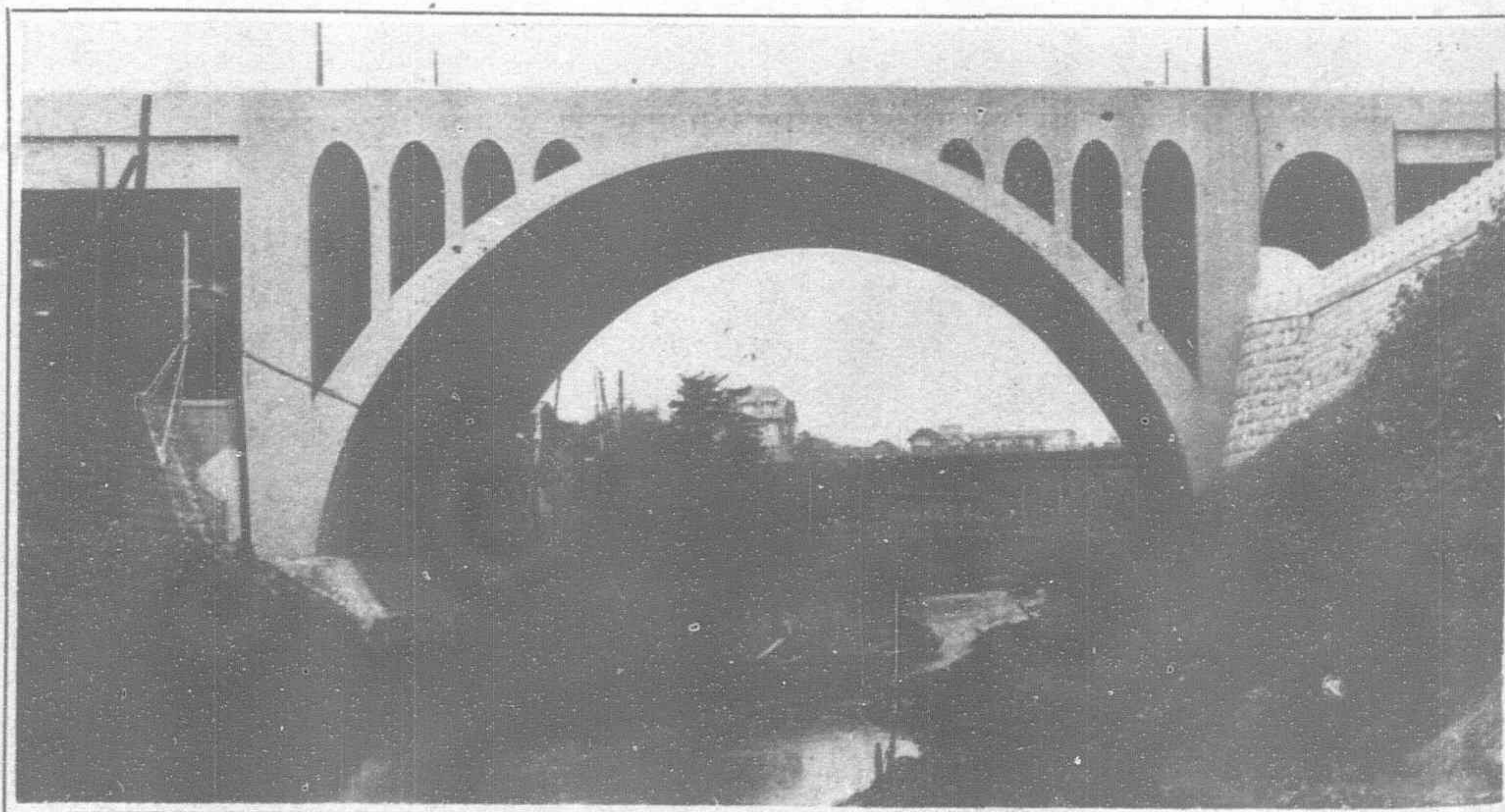
the remaining three have been three-fourths completed. It is expected that the construction will be finished during the first quarter of the year 1928. Of the Y.12,118,000 estimated as the cost of these bridges, Y.9,340,000 has already been expended.

Of the entire program of 117 bridges to be built by the Reconstruction Bureau in the city of Tokyo, including the six bridges over the Sumida River, 37 have been completed, 30 are under construction, and 39 have been completely designed; thus the bridge program is estimated to be 60 per cent. complete. Of the estimated expenditure of Y.32,000,000, Y.20,000,000 has already been expended. The percentage of completion and the amounts of money shown as expenditure for street construction include bridge-construction costs and percentage of completion. Of the 34 bridges being constructed in the city of Yokohama by the Reconstruction Bureau, 14 have been completed, 13 are under construction, and five others are completely designed.

It is of interest to note that in some construction American equipment has been used. An American locomotive crane was used on one structure; compressors and pneumatic riveters are almost entirely of American make; about 80 per cent. of the concrete mixers are also of American make. In general it may be said that concrete mixers of Japanese manufacture are used in the smaller sizes up to about eight cubic feet capacity, and American mixers are used for greater capacities. As the 8-cubic-foot size is in greatest demand, Japanese manufacturers make a considerable number of these, but even in this size there is a great demand for American mixers. This is due in considerable measure to the fact that operators and contractors have become accustomed to using American mixers and are acquainted with their efficiency and results, and some insist on them in preference to other makes.

It is also interesting to note that a considerable amount of American steel-sheet piling was used in the construction of these bridges. Competition is extremely keen between American sheet piling and the less efficient, lighter, and cheaper European steel-sheet piling. It is often impossible to remove and redrive European steel-sheet piling, while with the heavier American forms this is generally done.

In connection with pneumatic caissons and piers for three of the largest of these bridges, it may be worthy of remark that an American engineering firm was retained to co-operate with the Japanese authorities and did notable work.



HIJIRI-BASHI, TOKYO: This is an imposing reinforced concrete arch spanning a canal. It has a total length of 93 meters and a width of 22 meters

The Supervisory-controlled Sub-station of the Bombay, Baroda and C.I. Railway

UNATTENDED sub-stations are no longer a novelty, and their economic value for some time has been widely recognized, especially with regard to the reduction of capital expenditure on station buildings and of recurrent expenditure on wages, and also with regard to greater reliability and greater facility and effectiveness of control. The elimination of the need for sub-station attendants has additional importance in many cases of installations abroad on account of the lack of skilled operators and the unreliability of native labor. These considerations, together with the satisfactory operation given by installations in service have resulted in the extensive and increasing adoption of automatic sub-station plant, until at the present time almost every proposal for new sub-stations or additional plant for existing stations involves the consideration of automatic operation in one or other of its various forms.

In fully automatic sub-stations the starting up and shutting down of the sets, together with all necessary synchronizing and switching operations, is carried out without manual intervention, in accordance with the changes in the load conditions. The equipment also embodies a number of ingenious devices which ensure the correct operation of the plant and its safety in the event of any mishap, such as overheated bearings or faults on either the machines or the lines. This type of equipment has been and is still being very widely adopted, and has achieved complete success as far as it goes. It is, however, limited in its service in two respects. In the first place the controlling factor is the change in load conditions and the extra output follows the demand

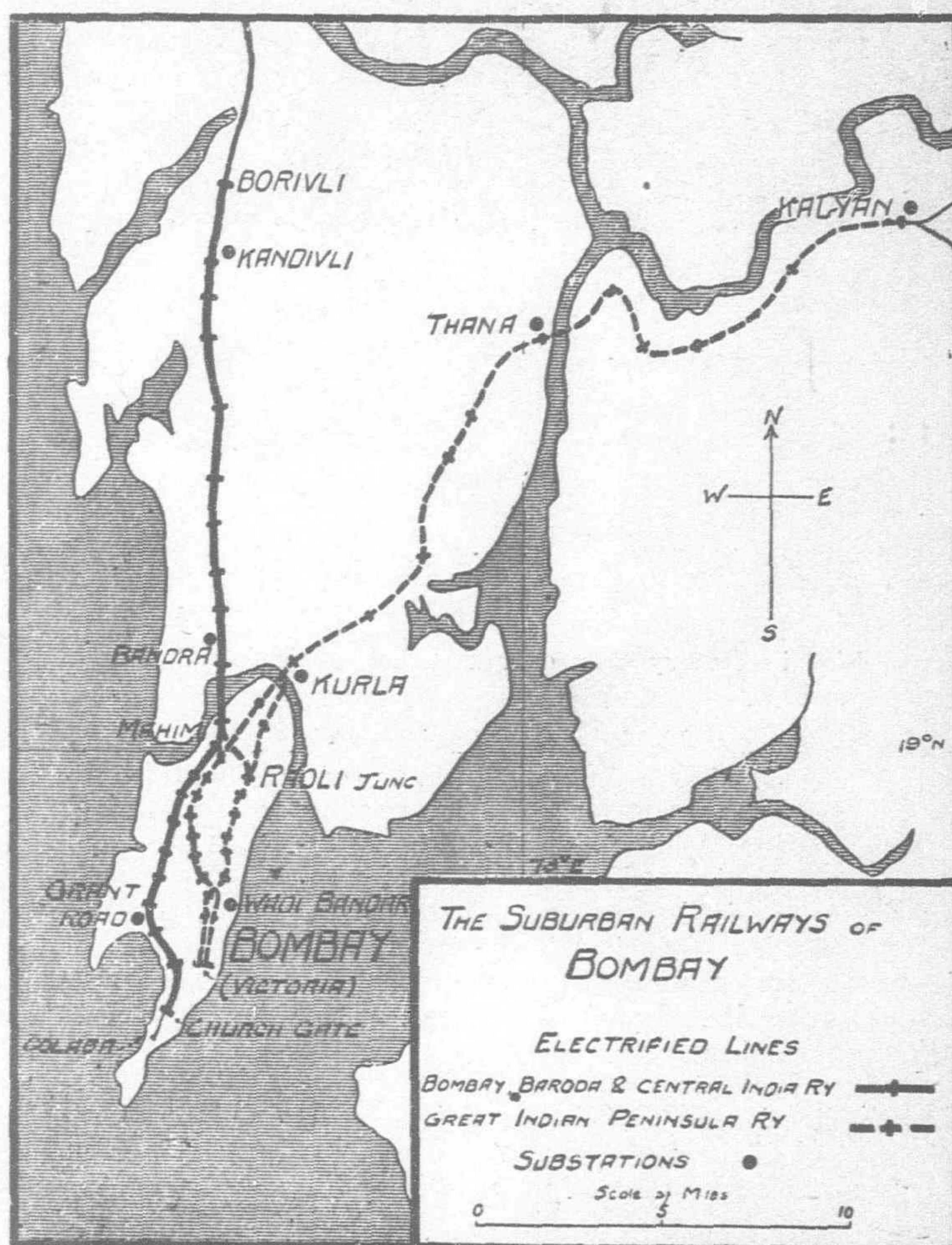


Fig. 1.—Map of the District

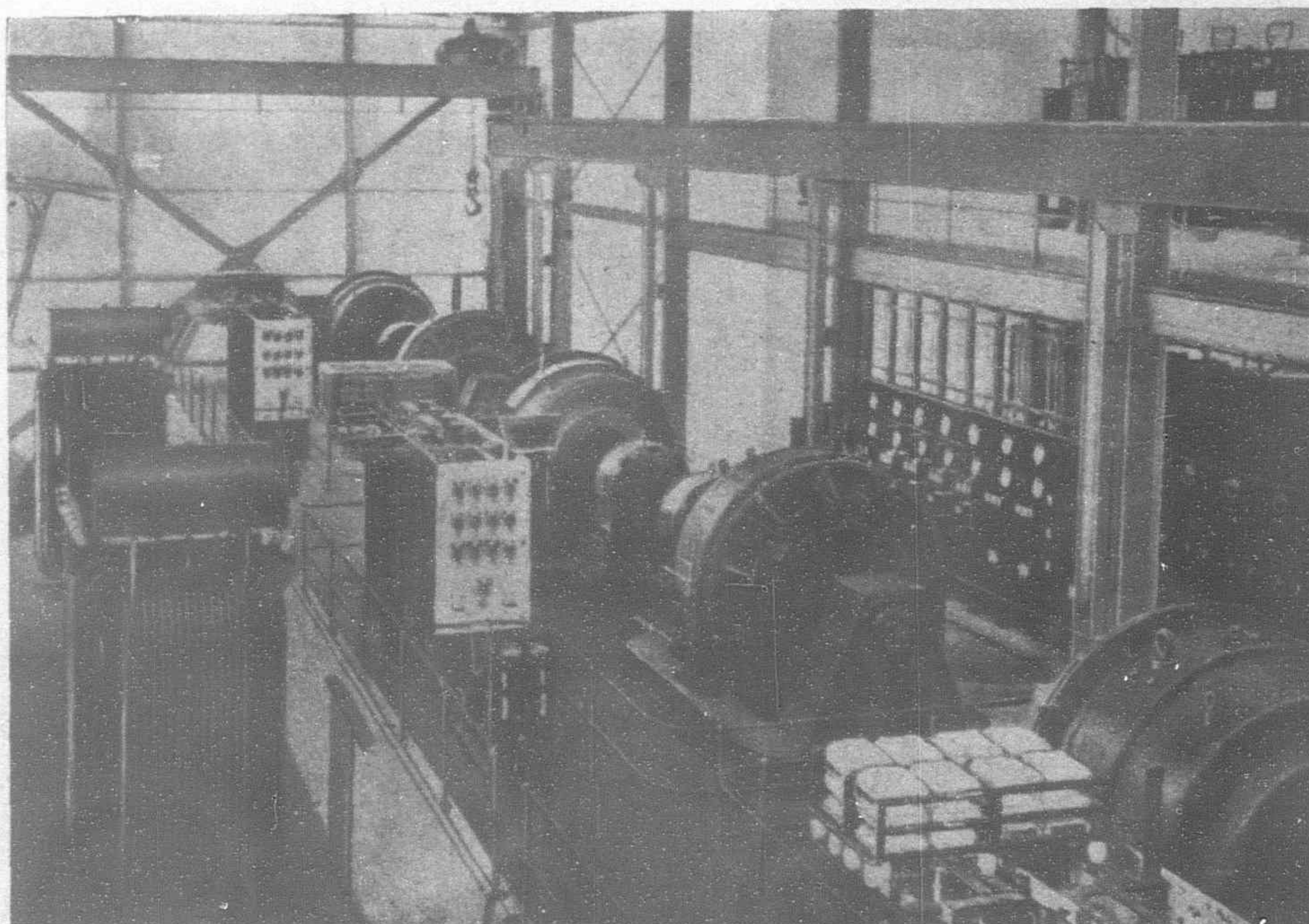


Fig. 2.—Interior View of the Bandra Sub-station

instead of preceding it. In the second place, the state of operation or otherwise of the various units of the plant is not ordinarily known at any attended point on the system. The first limitation is sometimes overcome by the provision of remote control gear for starting and stopping the sets from another sub-station or other control point. The second limitation is more difficult to overcome, and it is in order to perfect the service in this respect particularly that the more complete system known as supervisory control has been developed.

Supervisory control adds to the advantage of ordinary automatic equipment the invaluable possibility of the complete control of sub-stations from a control office, and of complete information at that point regarding the conditions existing on any of the main or auxiliary circuits involved. The apparatus used is a combination of automatic control gear with selective switching apparatus, the components of the latter being such as are used in automatic telephone systems.

The first supervisory control equipment manufactured in this country was developed by the Metropolitan-Vickers Electrical Company in conjunction with the Automatic Telephone Manufacturing Company, of Liverpool, the first installation being for a sub-station at Wellington, N.Z. Further developments have since been made with this system and a notable large-scale installation has recently been put into service on the electrified suburban lines of the Bombay, Baroda & Central India Railway. This installation is of special interest in that it provides for the complete control of the whole power supply for train operation. There are no manually controlled sub-stations, the direct current supply

being provided by three sub-stations with a total capacity of 20,000 kw., all controlled on the supervisory system from a central office.

The suburban service of the B.B. & C.I. Railway is claimed to be the largest and busiest in the whole of India. The section electrified is that on which the local traffic is heaviest. As shown in Fig. 1, it extends from Colaba to Borivli, a distance of 23 route miles with 57 miles of electrified track, the lines being double except between Grant Road and Mahim, where four tracks have been electrified.

The whole of the power required for the operation of the electric service is obtained from the hydro-electric generating stations controlled by Messrs. Tata Sons, Ltd., which are situated in the Western Ghats some 100 miles distant from Bombay. The power is transmitted to Bombay in the form of three-phase alternating current at 110,000 volts, 50 cycles, and is received at the Dharavi receiving station where it is transformed down to 22,000 volts for supply to the railway sub-stations, which are at Grant Road, Bandra and Kandivli.

The sub-stations at Grant Road and Bandra are each equipped with three sets of rotary converters, and the sub-station at Kandivli has two sets. All the rotary converter sets are similar, each set consisting of two separate machines of 1,250 kw. capacity, 750 volts direct current, operating in series to give an output per set of 2,500 kw. at the required line pressure of 1,500 volts. In addition to the main transformers the sub-stations are equipped with small transformers which step down the voltage from 22,000 to 2,200 volts, at which pressure a supply is taken along the line for station lighting and auxiliary purposes. The complete control of the sub-stations, including all high tension and low tension switching operations, and also of the equipment of two track-sectioning cabins at Elphinstone Road and Andheri, is effected by means of the supervisory control gear from a control office which is situated between Bellasis Bridge and Mahalakshmi Station, 17 miles from the most distant sub-station.

The whole of the electrical equipment of the sub-stations, track-sectioning cabins and the control office was supplied by the

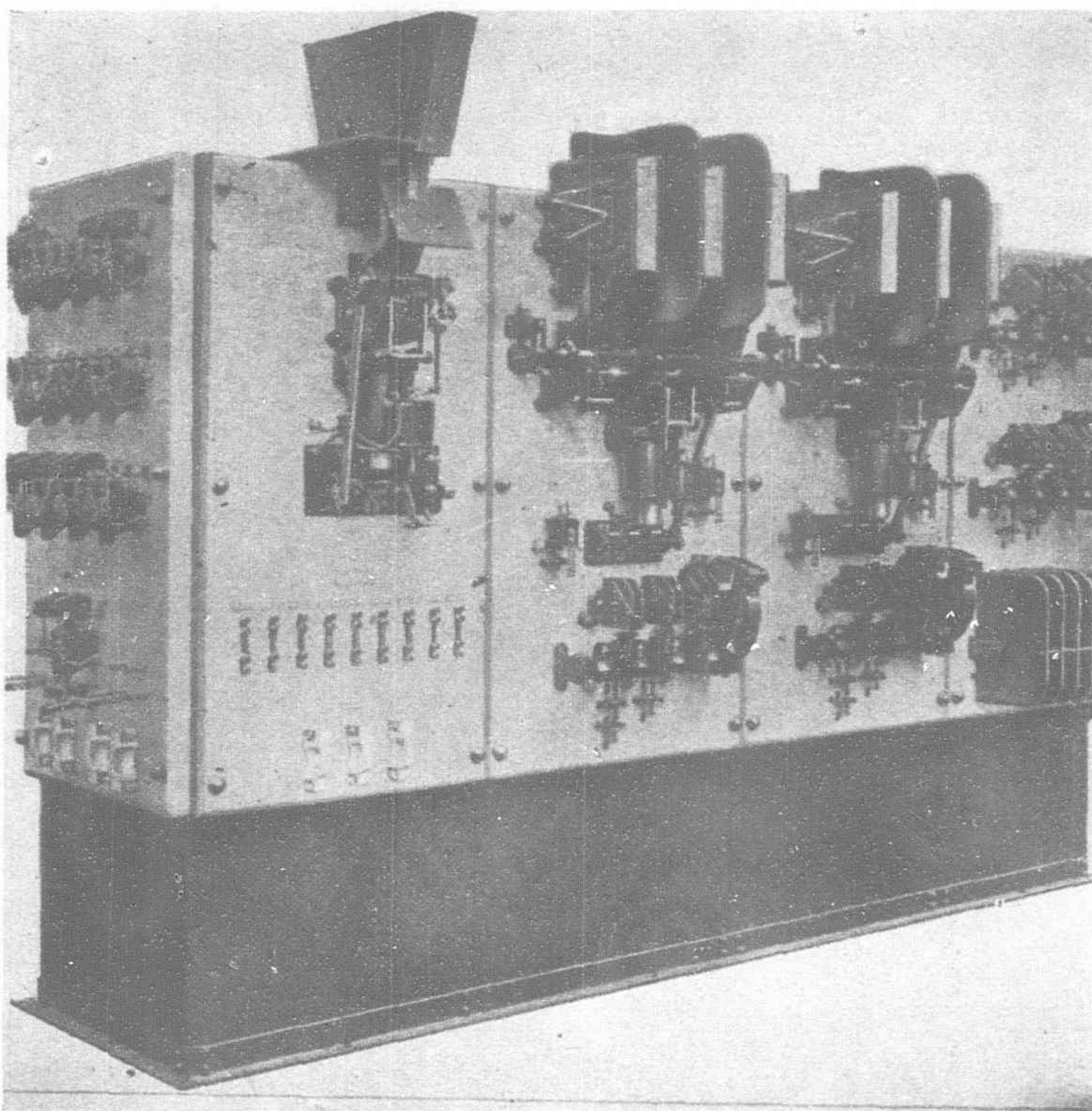


Fig. 4.—Rotary Converter Starting and Relay Panels

Metropolitan-Vickers Electrical Company to the requirements of Messrs. Merz & Partners, the Consulting Engineers for the electrification scheme. Some notes on the principal items of the equipment, and especially on the supervisory control gear, are given below.

The general layout of one of the sub-stations—that at Bandra—is shown in Fig. 2, and may be taken as typical of the arrangement and equipment of all three sub-stations. The 22,000-volt supply is controlled by Metrovick metal-clad switch gear, nine circuit-breaker units at Bandra, seven units at Grant Road, and six units at Kandivli. In Fig. 2 the metal-clad circuit-breakers are seen on a gallery on the right, with the H. T. control panel below.

The automatic starting and protective relay panels are seen in Fig. 2 between the rotary converters and their transformers. A detailed view of one of the equipments is shown in Fig. 4. The large units on the middle panels are the three-

pole running contactors for the two machines, that on the left is the equalizing contactor for the set, and the small units are operative contactors for the main contactor gear.

Each rotary converter set has a rating of 2,500 kw., 1,500 volts direct current, and consists of two 750-volts, six-phase, 50-periods, 600 r.p.m. machines connected in series. The machines are arranged for self-starting on the Metropolitan-Vickers patent self-synchronizing system, and each set is supplied from one 2,750 kva. transformer, having a double six-phase low tension winding.

The special tests on the rotary converters included a series of dead short-circuits applied to a selected set, protected by a Metrovick high-speed circuit-breaker, under conditions similar to those of normal service. The short circuits were made by closing an oil-switch, the total resistance of the closed d.c. circuit being .0029 ohms, which is equivalent to 115 yards of 1 sq. inch cable. A typical oscillograph record of a short circuit is shown in Fig. 6, from which it will be seen that the d.c. current reached a maximum value of 16,800 amperes, i.e., approximately ten times normal full load current. This value was reached in .009 seconds, by which time the high-speed circuit-breaker had opened sufficiently to cause the current to commence falling.

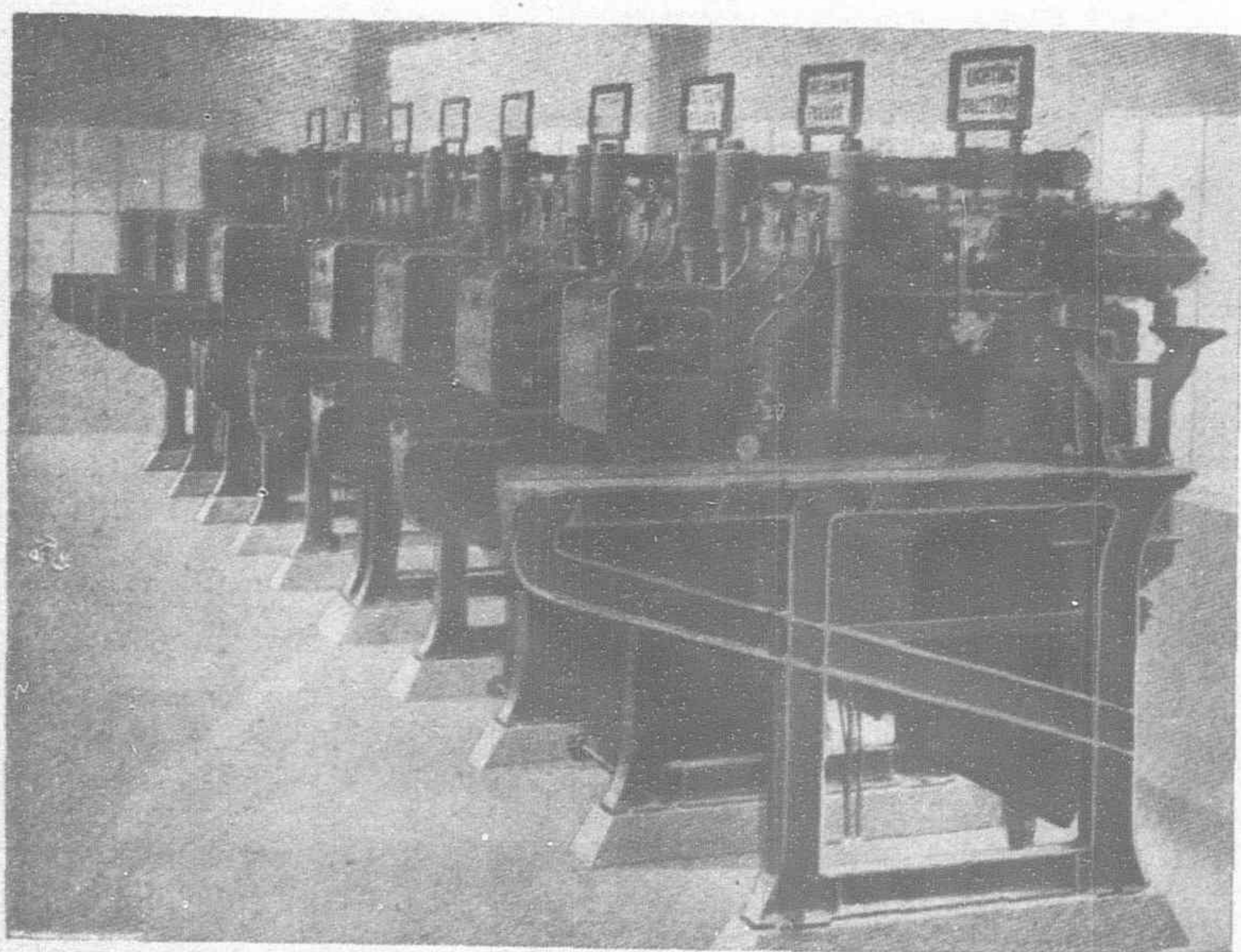


Fig. 3.—Metal-clad Circuit-breakers for 22,000 Volts

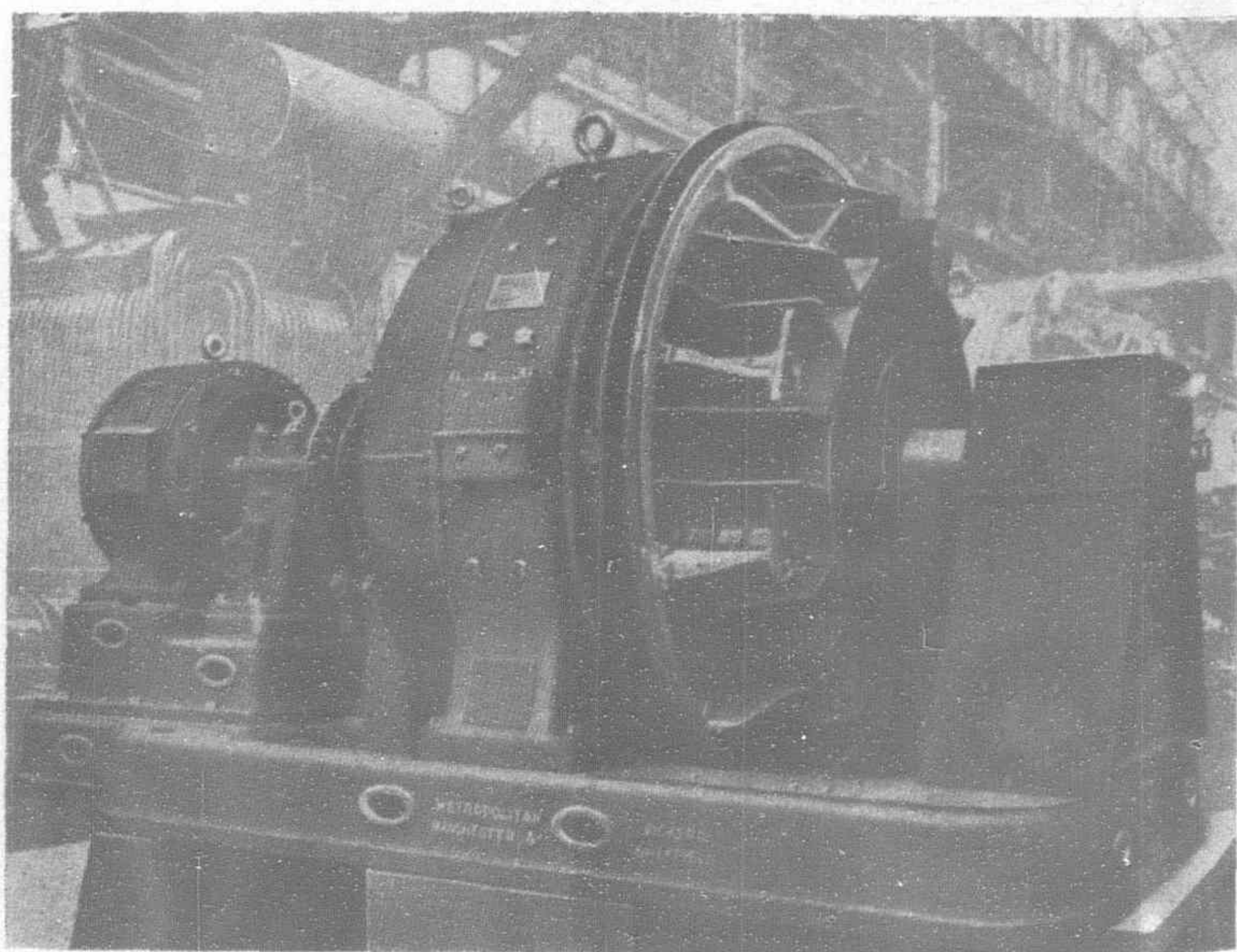


Fig. 5.—One of the 1,250 kw 750 Volt Rotary Converter Units

The machine circuit-breakers have an overload setting (with adjustable time lag) only, while the feeder breakers have both instantaneous overload and impulse tripping. This arrangement allows a faulty feeder to be cleared without interrupting the supply to the other feeders. In the sub-stations the high speed circuit-breakers and the other direct current switch-gear are arranged in the form of truck type switchboards. Fig. 7 shows the direct current switchboard at the Bandra sub-station, comprising six feeder panels and three panels for the rotary converter sets.

Similar truck type boards are installed at the track-sectioning cabins for the control of the direct current feeders. Eight feeder switch units are installed at the Elphinstone Road cabin, and four at the Andheri cabin. The incoming 2,200-volt supply to the cabins is controlled in each case by a metal-clad oil circuit-breaker unit.

The three sub-stations together with the two track-sectioning cabins are controlled on the Metrovick supervisory system from a control office which is situated between Bellasis Bridge and Mahalakshmi Station. No attendants are required at the sub-stations or track cabins except for periodical cleaning and overhaul. All switching operations, including the starting and stopping of each of the eight converter sets, are directly controlled from the control office; and, furthermore, the due accomplishment of the various operations and the functioning of the switches and rotary converters are accurately recorded back at this control centre.

With regard to the rotary converter sets, it should be noted that each set is accompanied by automatic control gear, by means of which the machines are run up to speed, synchronized and connected to the direct current busbars, or disconnected and stopped when the initiating impulses for these operations are given by the supervisory gear.

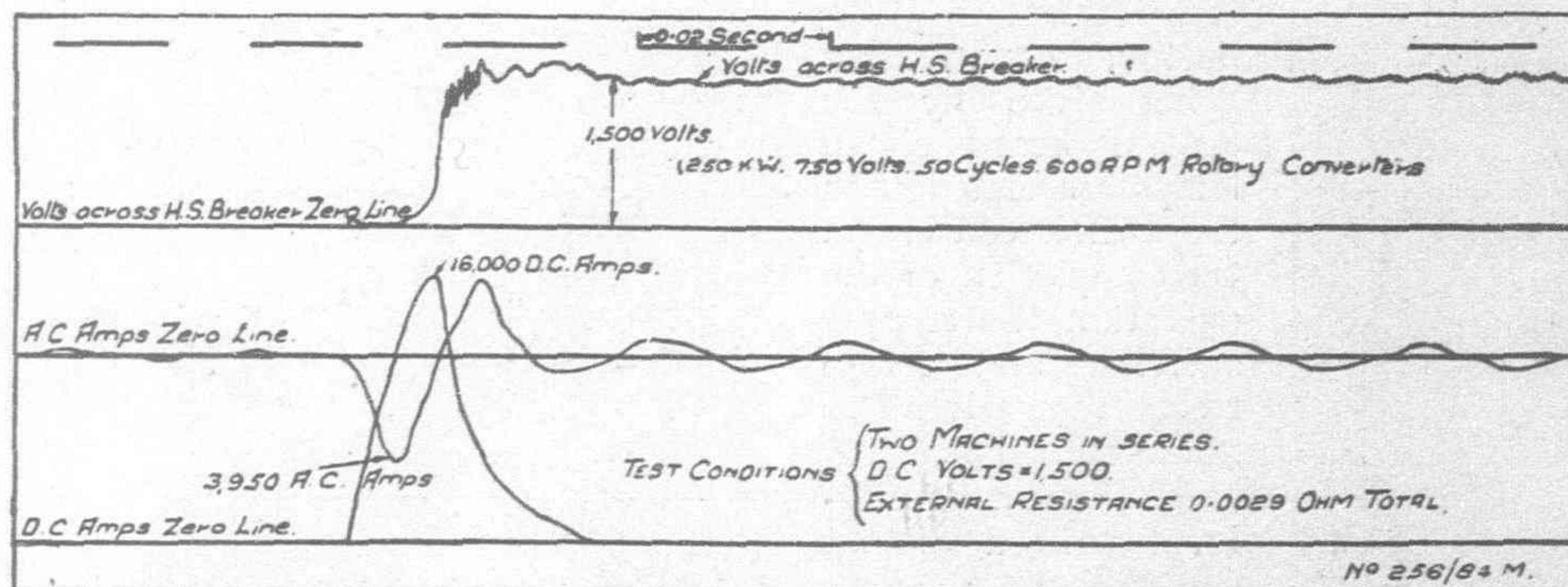


Fig. 6.—Oscillograph Record of a Short-circuit on a 2,500 kw, 1,500 Volt Rotary Converter Set

panels are each associated with the indicating diagram of the power circuit they control, the whole forming a complete diagram of the system. Each selector switch has its own indicating lamps mounted behind red and green opals to indicate whether the corresponding distant circuit-breaker is open or closed.

The operation of closing or tripping a remote circuit-breaker consists of two distinct operations by the supervisor, viz:—

- (a) The operation of a particular selector switch.
- (b) The operation of a common push button.

The function of the selector switches is to prepare the circuit for the actual switching operation. The apparatus by means of which this is accomplished is similar to that used in automatic telephone exchanges, including the new G.P.O. exchanges in London. It consists essentially of rotary stepper switches, one of which is shown in Fig. 8 and auxiliary

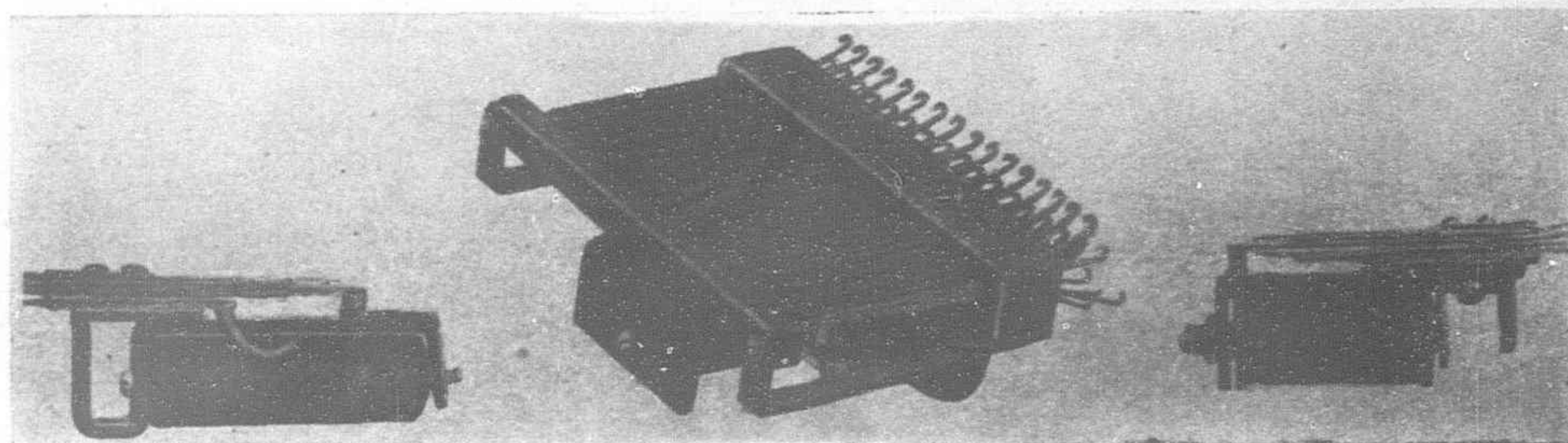


Fig. 9.—Typical Relays of the Supervisory Control Equipment

relays such as are shown in Fig. 9. The operation of a selector switch energizes a relay which prevents any other operation signal being sent out simultaneously, and also energizes a stepper switch which proceeds to send out a multi-impulse signal to the substation. According to the pre-determined arrangement of these impulses a combination of stepper switches and relays at the substation establishes the connection corresponding to the selector switch which has been operated and lights a white lamp on the control board confirming correct selection. The time taken for this sequence is about three seconds. The operating pilot wire being now suitably connected, the operation is put into effect by pressing

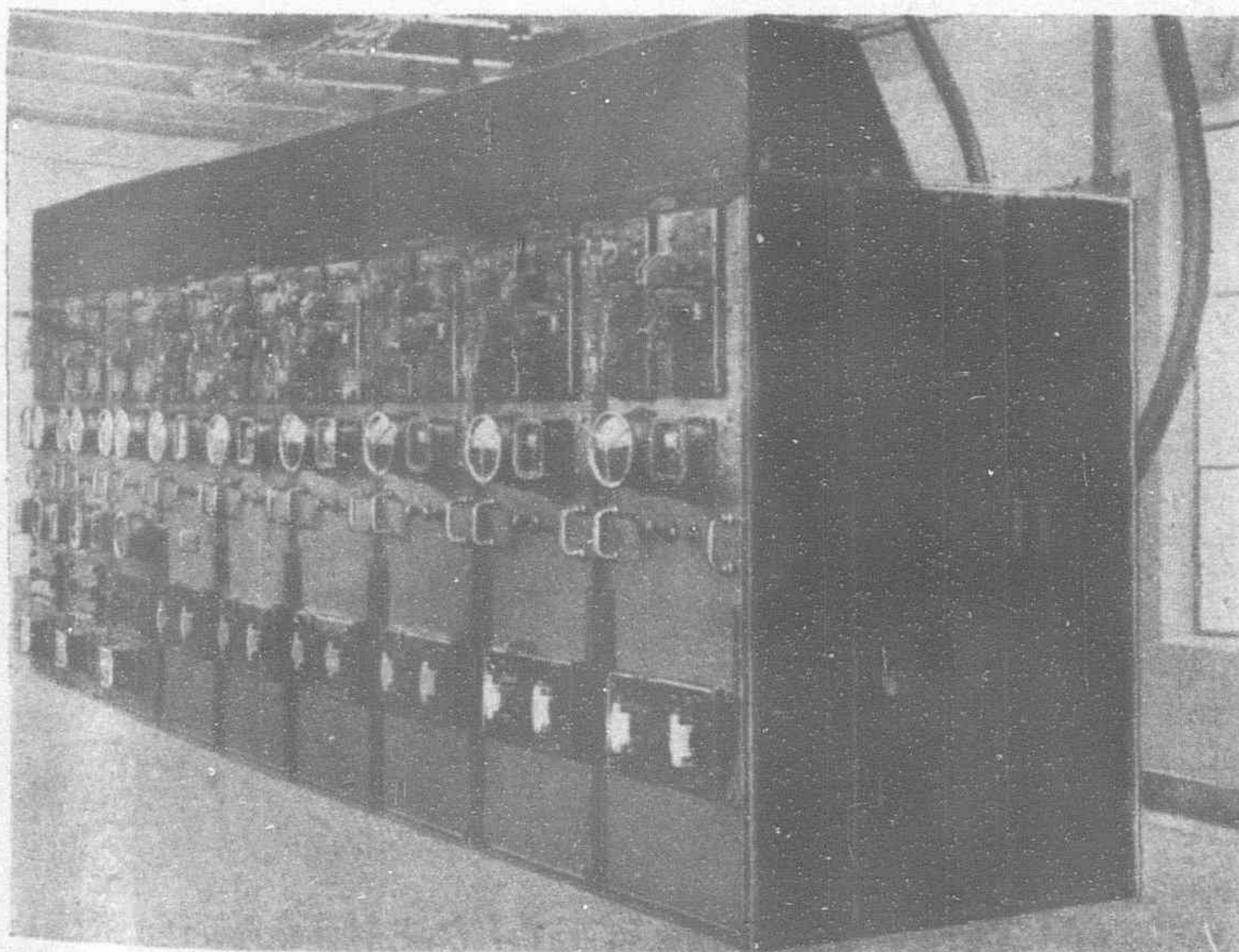


Fig. 7.—Direct Current Switchboard at Bandra Sub-station

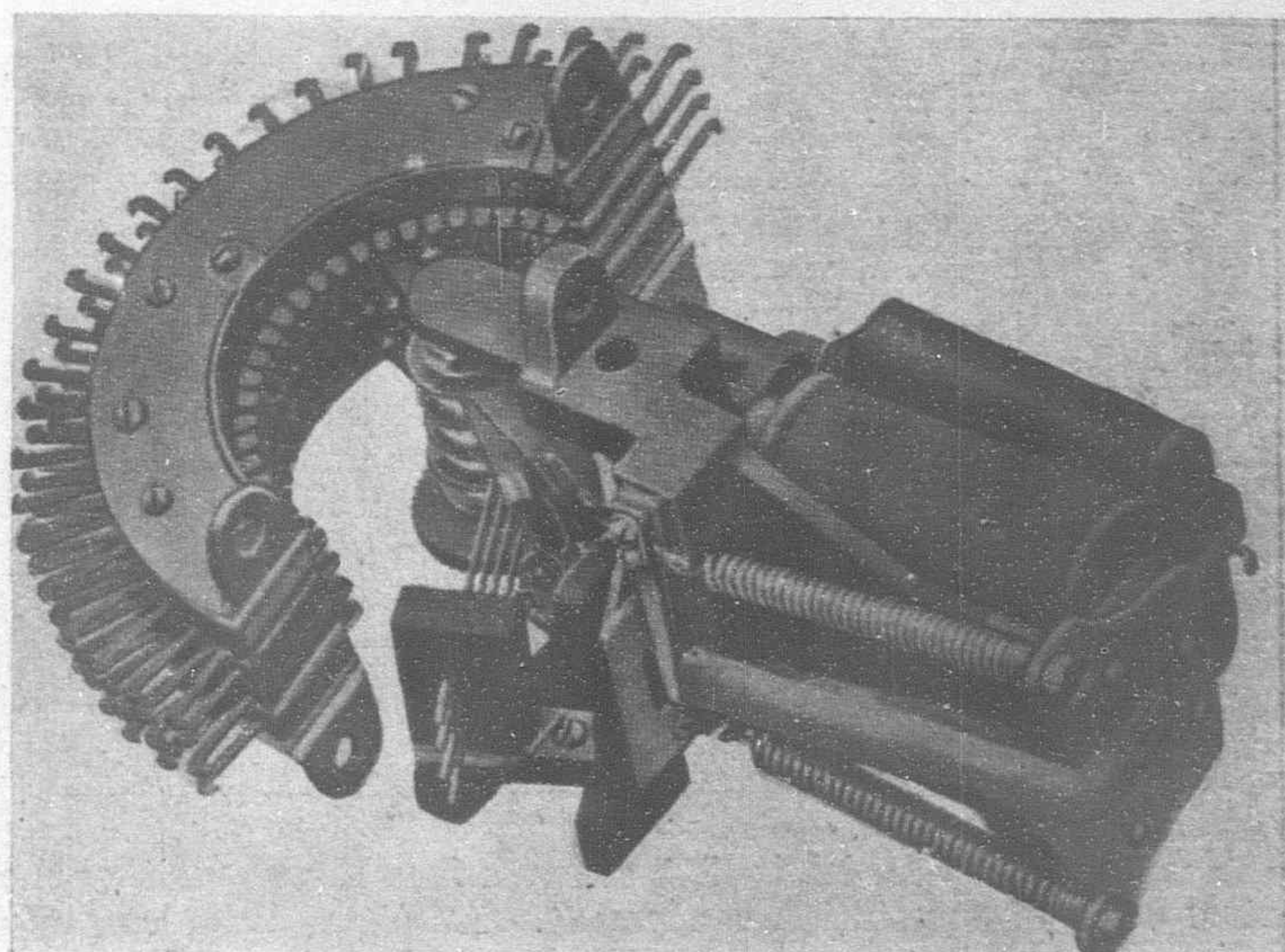


Fig. 8.—The Stepper Switch of the Supervisory Control Equipment

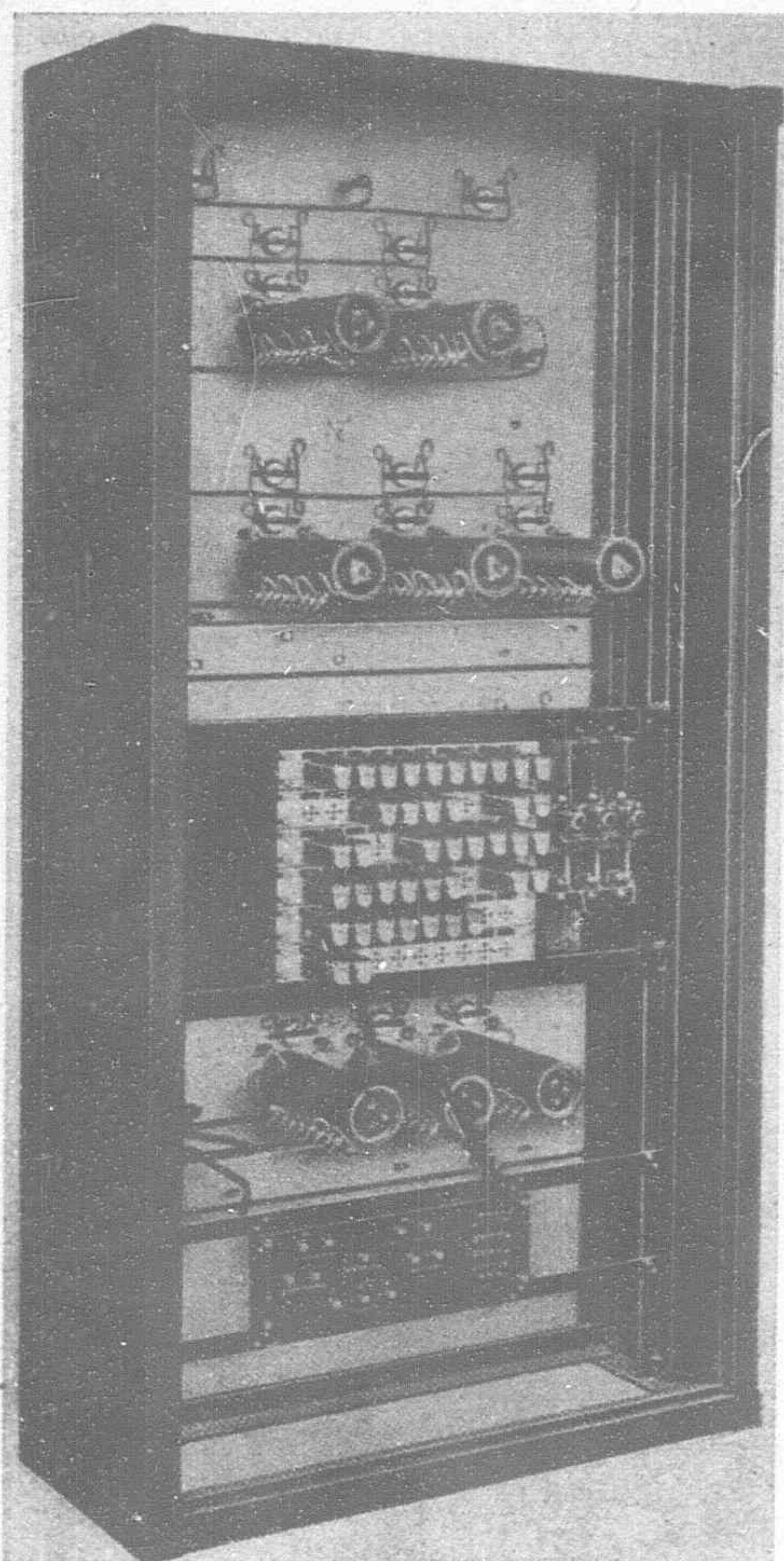


Fig. 10.—View of the Back of One Panel of the Control Board

the common push-button, confirmation being given by the control board signal lamps associated with the switch concerned. On completion of the operation the stepper switches and relays reset themselves to normal position.

When a circuit-breaker in a distant sub-station opens automatically, an alarm bell is set ringing in the control office, and the unit which has operated is indicated by a red lamp on the corresponding control panel. This signal, and also the lamp signals confirming the opening or closing of a circuit-breaker from the control office are initiated by auxiliary contacts on the circuit breakers and transmitted as coded impulses by relays and stepper switches in the way already described.

In addition to these normal condition operations, comprehensive provisions are

made for dealing with various other contingencies. Some of the more important and interesting of these are as follows:—

Should a circuit-breaker change its position while impulses are being sent from the control desk to select a device for operation, the sub-station signal is stored until the incoming impulses are completed, when the latter are cancelled out and the stored signal is sent through to the control office.

Should a circuit-breaker change its position while a signal is being transmitted from the sub-station, its change is signalled immediately the first signal is completed.

Should a signal from the sub-station be in course of transmission when the supervisor proceeds to select a circuit-breaker from the control desk the selector switch produces no effect.

Should a circuit-breaker trip immediately after being closed a signal records the closing of the breaker, and then another signal indicates the actual position of the switch.

Should a fault exist on a direct current feeder when the feeder switch is required to close, excess current through an auxiliary contactor with a limiting resistance energizes a relay which prevents the main breaker from closing. This condition is signalled by the alarm bell and signal lamps at the control office.

Should any rotary converter become over-heated, the fact is signalled at the control office by an alarm bell and a red lamp which is mounted in the center of the rotary converter symbol on the control panel. This warns the supervisor that another set should be started up. The red lamp continues to glow until the overheated machine cools to a predetermined temperature.

In addition to the items already mentioned, the following apparatus is mounted on each control panel:—

A yellow lamp which glows intermittently when selecting impulses are being sent out from that panel.

A checking key by means of which all the lamp indications may be checked at any time.

Two blue lamps which indicate when a fuse blows on either the control office of sub-station equipment. An alarm bell also gives warning should this occur and the blue lamp continues to glow until the fuse is replaced. On the replacement being effected all lamp signals are automatically checked.

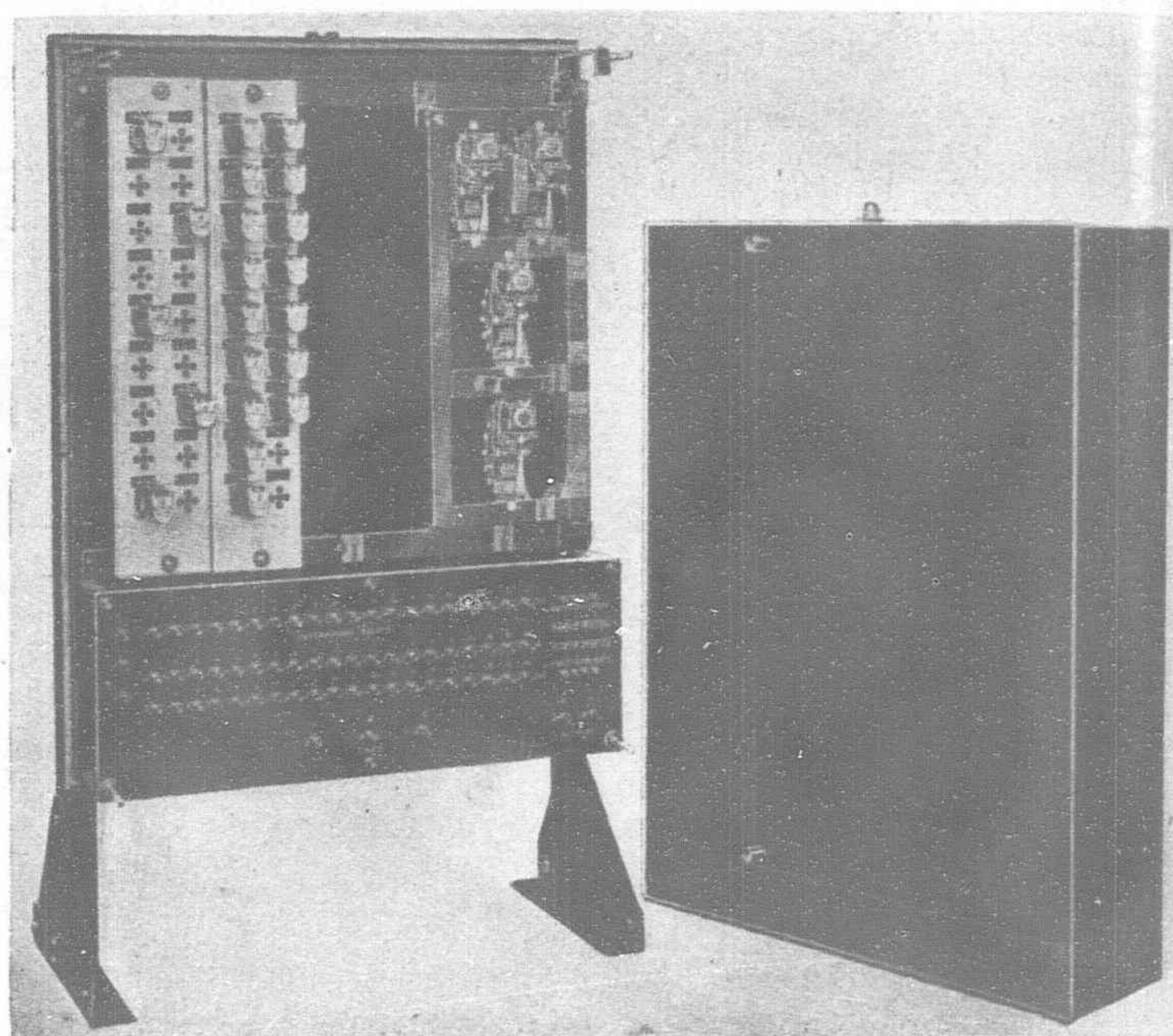


Fig. 11.—Sub-station Cabinet for Supervisory Control

A testing jack for testing the condition of the pilot lines by plugging in a special instrument.

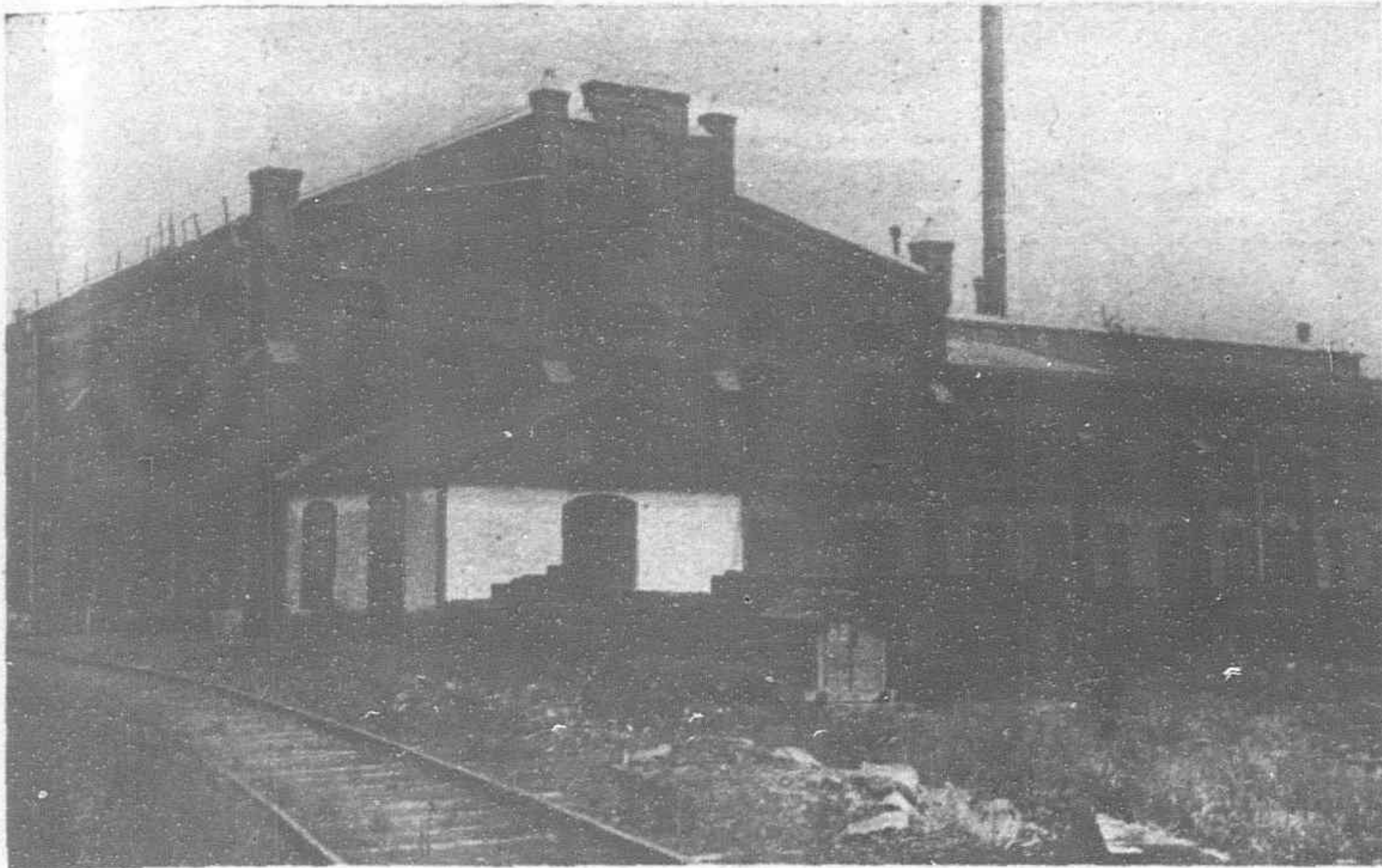
The arrangement of the selector switches and other apparatus on the control panels is illustrated in Fig. 10. The panels constitute the fronts of independent cubicles which have removable doors at the back. At the sub-stations the relays and switching apparatus are mounted in dust-proof metal-cased cabinets, one of which is seen with cover removed in Fig. 11. Each panel of the central control board is connected with its corresponding sub-station apparatus cabinet by a pair of pilot line wires, and a return lead which is common to all sub-stations. An important feature of the system is that, irrespective of the number of circuit-breakers to be controlled, in each case the control and supervision is effected by means of only these three connecting lines.

Experience with supervisory control has shown that it provides the most effective system of informed control which has yet been devised for power distribution systems. The control is as complete as that which could be exercised by a skilled engineer in each sub-station, but with the advantage of complete and immediate information at the control point regarding the conditions on the whole of the system. This feature of saving the time otherwise lost in receiving telephone reports and transmitting instructions to operators is of great importance in that it facilitates rapid resumption of service after any disturbance. For these reasons, in addition to the economic and other considerations already indicated, supervisory control is likely to find extended application both for electric traction systems and for power distribution networks.

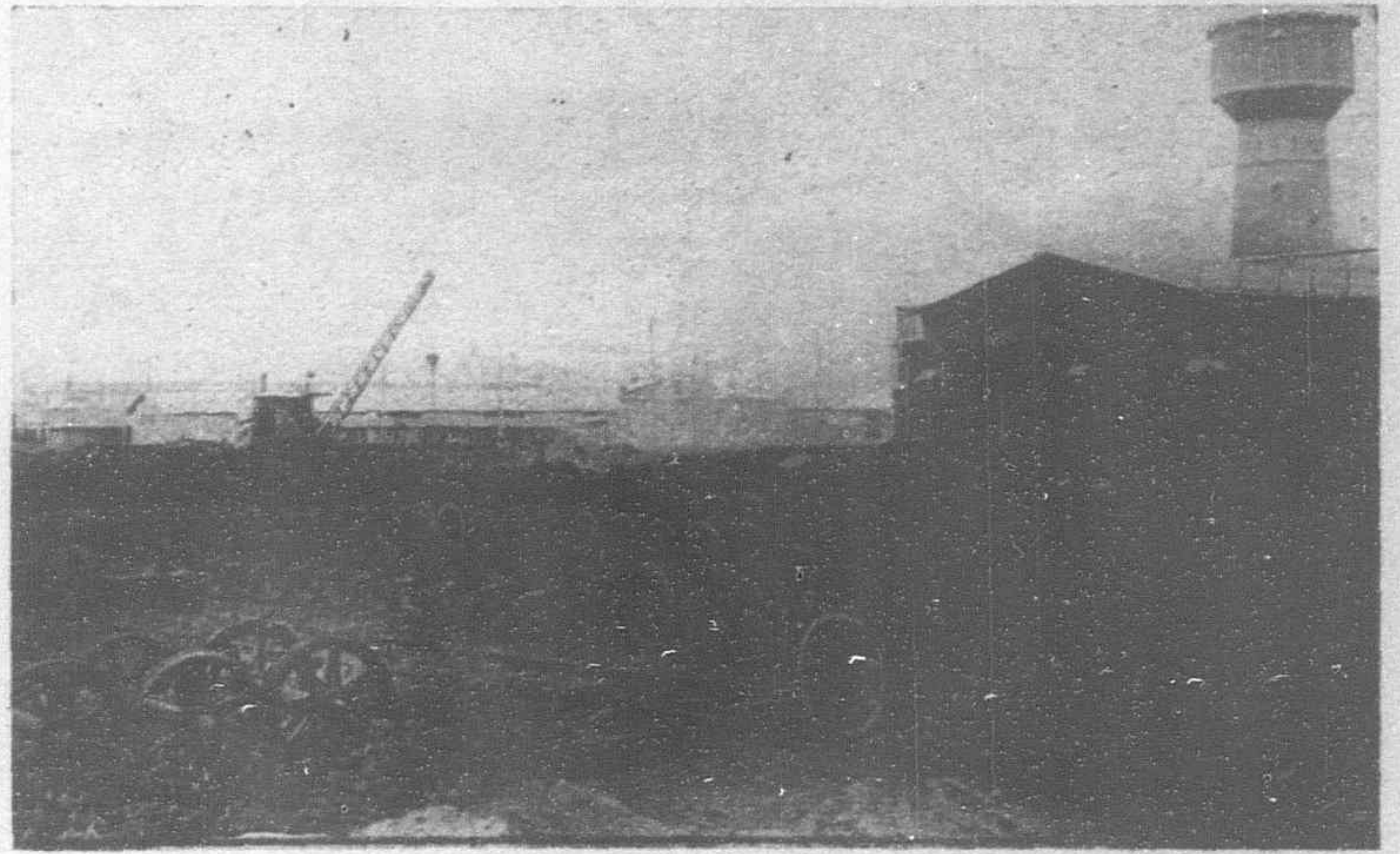
Work on Canton-Hankow Railway

Mr. H. S. Chuck, managing-director and chief engineer for the unfinished portion of the Canton-Hankow Railway, reported on his inspection trip over the proposed route linking up Chuchow (in Hunan) with Shiuchow (in Kuangtung province). Mr. Chuck was accompanied by Mr. J. Weir, Consulting Engineer to the Ministry.

He will arrange to start construction of the first 31-mile section of the line from the northern terminus of the Kuangtung end. The estimated cost for building and equipping this section will be approximately \$7,000,000, and noteworthy engineering features include a bridge of seven spans with a total length of 760 feet at Shiukwan, and a 1,400 feet tunnel at Kaolin, which is about half-finished.



Foundry



Spare Wheel Yard

The Harbin Main Shops of the Chinese Eastern Railway

THE Main Shops of the Chinese Eastern Railway are situated at Harbin,—this city being the central point of the railway. Their construction was started in 1903 and completed to the end of 1907. The Main-Shops are situated near the Sungari river, and are connected with Harbin Station by two railway tracks. These Main shops were laid out at Leningrad (former St. Petersburg) and their annual productive capacity was planned to be as follows: Capital repairs of 90 engines, 80 passenger carriages and 400 freight cars.

Periodical inspection and repairs of passenger and freight cars as well as ordinary locomotive repair work was then expected to be done at the round house shops.

Besides the above work which is being done for the needs of the Chinese Eastern Railway itself, the Harbin Main-Shops had to take in 1916 the entire care of erecting the "Decapod" locomotives which were ordered in the United States of America during the war and shipped to Harbin *via* Vladivostok. Altogether seven hundred and ninety-four Decapod locomotives were erected during the period from 1916 to 1920.

The Harbin Main shops are divided into following divisions:

1. Locomotive erecting shop. 2. Boiler shop. 3. Passenger carriage shop. 4. Freight car shop. 5. Mechanical and Wheel shops, 6. Black-smith shop, and, 7. Foundry.

Moreover, several accessory enterprises are included in Main shops. They are:

1. Electric Power Plant, 2. Saw mill, 3. Linseed-oil factory, and, 4. Cotton-waste cleaning works.

The mechanical equipment of the Main shops consists of the following:

1. Four Power Units with a total capacity of 1,600 H.P.

2. Electric Motors for power drive from 1 to 50 H. P., 337.

Electric Motors for travelling cranes, 53.

3. Steam heating Plants with a total heating surface, 602 m².

4. Machine tools of different kinds, 430

5. Pneumatic installations with a total capacity of 15,5 m³ of free air per minute.

6. Eight Electric-Welding apparatuses . . . 8

At present Harbin Main shops are doing the following rolling stock repairs:

1. Capital repairs of locomotives as follows: Freight locomotives, every 190,000 kilometers. Passenger locomotives every 250,000 kilometers.
2. Ordinary "small" locomotive repairs every 32,000 kilometers for freight locomotives, and every 42,000 kilometers for passenger engines.
3. Incidental repairs for wrecked locomotives.
4. Capital repairs of passenger carriages every seven years of their service.
5. Ordinary repairs of passenger carriages every 3½ years service after the capital repairs.
6. Periodical inspection of passenger cars after their one year's service.
7. Periodical inspection of freight cars after three years service.
8. Heavy repairs of freight cars, either worn out or damaged in wrecks.
9. Manufacture and storing of all spare parts necessary for rolling stock repairs.

The capital repairs of locomotives are made on special schedules in 24 working days.

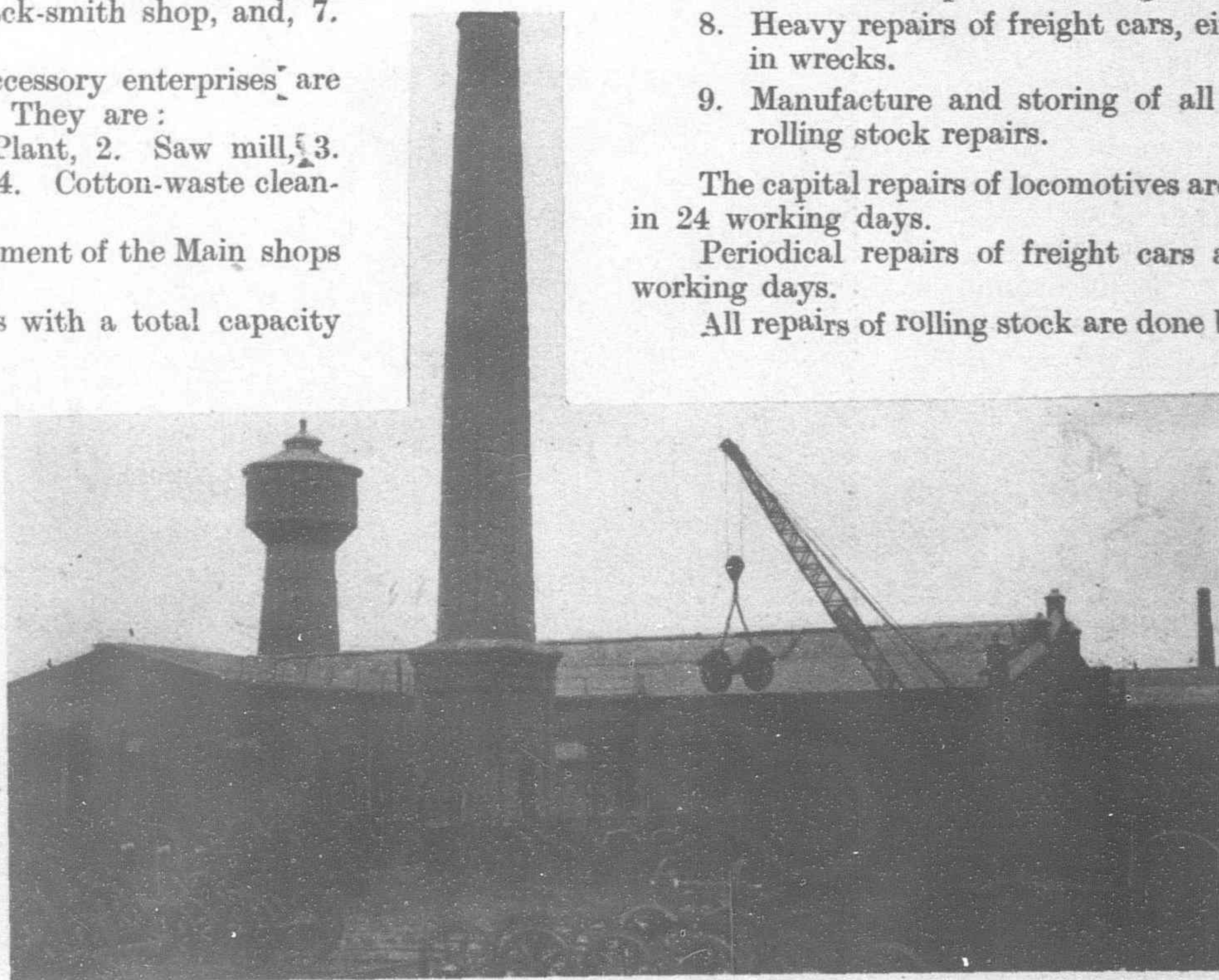
Periodical repairs of freight cars are also scheduled for six working days.

All repairs of rolling stock are done by piecework in accordance to regularly fixed rates which are based on time, and payments are done according to Prussian-Hessian system without limiting of percentage of gains.

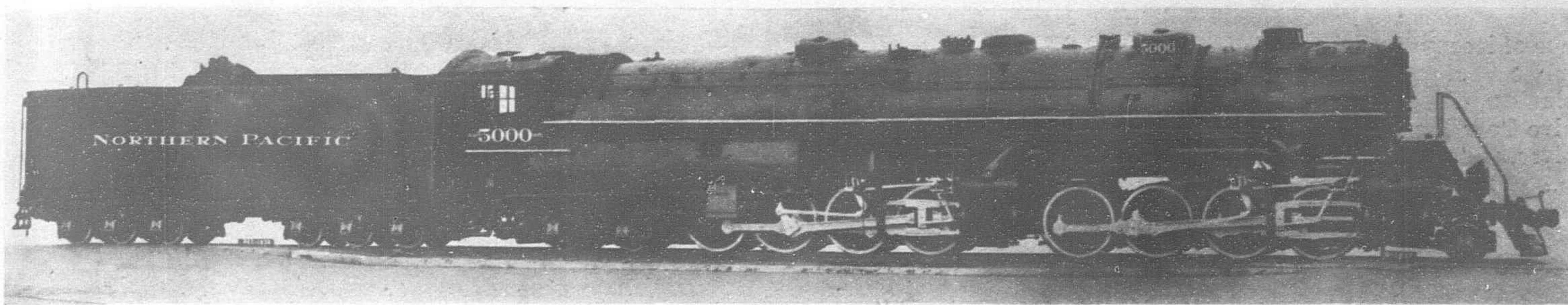
1.—LOCOMOTIVE ERECTING SHOP

The number of locomotives repaired:

Capital repairs, 37.
Incidental repairs, 64.
Average time of capital repairs in calendar days, 37.
Average time of capital repairs in shifts, 28.



The Wheel Shop



America's Largest Locomotive

The Leviathan of the Rails

THE largest and most powerful locomotive ever built has recently been completed by the American Locomotive Company for the Northern Pacific Railway. This "Leviathan of the Rails" is a single expansion articulated 2-8-4 type and has been christened by the Northern Pacific as the "YELLOWSTONE" type. The engine and tender have a total weight of 1,118,000 pounds, of which 717,000 pounds is the weight of the engine and 401,000 pounds is the weight of the tender. Of the engine weight 553,000 pounds is on the drivers, 48,500 pounds is on the front truck, and 115,500 pounds is on the trailing truck.

All four cylinders have the same diameter and stroke, 26-in. by 32-in., and the boiler (the largest locomotive steam boiler ever built) operates at a pressure of 250 pounds. The driving wheels are 63-in. in diameter. It develops a tractive power at 70 per cent. cut-off of 140,000 pounds and with the addition of power of the booster of 13,400 pounds, will have a total tractive power of 153,400 pounds.

The engine is capable of developing well in excess of 6,000 horsepower, and the overall length between couplers, engine and tender is 125 feet.

This new locomotive is intended for operation over the 216 miles district of the Northern Pacific from Mandan, N.D. to Glendive, Mont., across the so-called "Bad Lands" of western North Dakota and eastern Montana. This district has maximum grades of 1.1 per cent. The location and extent of the grades are such that helper districts are not practicable. Large 2-8-2 type locomotives with a tractive power of 63,000 pounds can haul but 2,225 tons between these points. This means that freight trains arriving at Glendive from the west with 4,000 tons, have to be into practically two trains for movement from Glendive to Mandan. The same condition obtains westwardly at Mandan. Surveys have developed that it would be extremely expensive to relocate this district to provide grades of four or five-tenths per cent. ruling grade. With the abandonment of this idea, the engineers of the Northern Pacific and the American Locomotive Company set out to design a locomotive that would take the 4,000 ton train in either direction over this district.

The railroad desired to use eastern Montana sub. bituminous coal from an open pit mine owned by the railroad at Colstrip, Montana. This coal, while comparatively low in heat units, burns freely. In order to obtain the required boiler horsepower from the heat developed by this coal, it was necessary to design the largest firebox and boiler ever applied to a steam locomotive. This boiler is a conical boiler built with a factor of safety of $4\frac{1}{2}$ for a working pressure of 250 pounds per sq. in. The grate area is 182 sq. ft., the total evaporating heating surface is 7,673 sq. ft. and the total superheating surface is 3,219 sq. ft. The weight of the boiler alone is 165,000 pounds. More than 20,000 holes were drilled in the boiler during construction. It is equipped with five Nicholson Thermic syphons and there are 5,153 Alco staybolts and 2,527 Alco welded cleaves in the firebox assembly.

The total length of the boiler is 63-ft. 8 $\frac{3}{4}$ -ins. and the firebox and combustion chamber combined are 28-ft. 6 $\frac{5}{8}$ -ins. long. At the front end the boiler has an inside diameter of 103 $\frac{1}{4}$ -ins. and at the throat connection an outside diameter of 110 $\frac{1}{4}$ -ins. The firebox has a length inside the sheets of 266 $\frac{1}{8}$ -ins. and a width of 114 $\frac{1}{4}$ -ins.

with a water space at the front of 7-ins., at the back 6-ins. and at the sides 6-ins. The combustion chamber has a length of 72 $\frac{1}{2}$ -ins. The inside firebox is in three sheets, the crown and side sheets being joined by arc welding. These sheets are also welded to the inside throat sheet and the one-piece combustion chamber is welded to the crown and inside throat sheet. Three of the five syphons are located in the firebox and two in the combustion chamber.

Coal is fed to the firebox with a standard Type B stoker, guaranteed to deliver 40,000 pounds of coal per hour. The ashpan has a Wilson bottom with the railroad company's standard dumping arrangement.

The unusual length of the grates—22-ft. 3-ins.—made it necessary to provide some additional means for manipulating a rake in the firebox other than through the firedoor. Two 9-in. by 14-in. openings, located on opposite sides of the firebox, are provided. They are located about 16-ft. from the rear of the firebox, so that it is possible to rake any part of the grate area from the firedoor or either of the two side openings with the ordinary style of firehook. Folding platforms are located underneath each of the side firebox openings.

The smokebox has a length of 146 $\frac{1}{2}$ -ins. and a diameter of 106 $\frac{1}{16}$ -ins. The Coffin feedwater heater installed on this locomotive consists of two size B heaters welded together so as to form the same uniformity of steam passage as in the single size B unit but with double its heat transfer capacity. It is said that this heater has the largest amount of heating surface of any feedwater heater ever placed on a locomotive. Two standard Coffin centrifugal pumps, having a combined capacity of 100,000 pounds of water per hour, are located one at the right and one on the left side of the locomotive. Separate control is provided for each pump. In addition to these pumps the locomotive is equipped with two emergency Hancock injectors, having a pumping capacity of 104,000 pounds per hour. The boiler is designed to evaporate 120,000 pounds of water per hour.

Steam is admitted to the cylinders by means of an American multiple throttle which is power operated. This is the first installation of a power throttle device on a steam locomotive. The device is air-operated and was designed and built by the American Locomotive Company. Provision is also made for manual operation when so desired.

The engine truck frame and radius are in a single steel casting which also includes the journal boxes. The wheels of the engine trucks are 33-in. in diameter and have 7-ins. by 14-in. journals.

The front drivers of each engine unit are equipped with the Alco lateral motion device. The main drivers have 12 $\frac{1}{2}$ -in. by 14-in. journals, and the remaining drivers 11 $\frac{1}{2}$ -in. by 14-in. All driving axles are hollow bored. Crisco boxes are applied to the bearing of the main and intermediate drivers of both engines.

The Franklin booster operates at 50 per cent. cut-off. It provides power to the rear wheels of the four-wheel trailing truck. The rear trailer wheels are 42-ins. in diameter with 9-ins. by 14-ins. journals.

The tender has a capacity for 21,200 gallons of water and 27 tons of coal and is of welded construction throughout. The water bottom tender frame and six-wheel equalized truck are Commonwealth design.

Dimensions and Weights

Type of locomotive	.. ..	2-8-8-4
Service	.. ..	Freight
Cylinders, dia. and stroke	.. ..	4—26-in. by 32-in.
Valve Gear Type	.. ..	Walschaert
Valves, piston type, size..	.. ..	14-in.
„ maximum travel	.. ..	7½-in.
„ outside lap	.. ..	1⅞-in.
„ exhaust clearance	.. ..	line and line
„ Lead in full gear	.. ..	3/16-in.
„ max. cut-off in full gear	.. ..	70 per cent.

WEIGHT IN WORKING ORDER—

On drivers	.. ..	553,000 pounds
On front truck	.. ..	48,500 „
On trailing truck, front axle	.. ..	55,000 „
On trailing truck, rear axle	.. ..	60,500 „
Total engine	.. ..	717,000 „
Tender	.. ..	401,000 „
Total engine and tender	.. ..	1,118,000 „

WHEEL BASES—

Driving	.. ..	44-ft. 6-in.
Rigid	.. ..	16-ft. 9-in.
Total engine	.. ..	66-ft. 8-in.
Total engine and tender	.. ..	99-ft. 8-in.

WHEELS, DIA. OUTSIDE TIRES—

Driving	.. ..	63-in.
Front truck	.. ..	33-in.
Trailing truck front..	.. ..	36-in.
„ „ rear	.. ..	42-in.

JOURNALS, DIA. AND LENGTH—

Driving, main	.. ..	12½-in. by 14-in.
„ others	.. ..	11½-in. by 14-in.
Front truck	.. ..	7-in. by 14-in.
Trailing truck, front	.. ..	7-in. by 14-in.
„ „ rear	.. ..	9-in. by 14-in.

BOILER—

Type	.. ..	Straight top
Steam pressure	.. ..	250-lbs. per sq. in.
Fuel, kind	.. ..	Rosebud sub-bituminous
Dia, first ring, inside	.. ..	103¼-in.
Dia. back ring, outside	.. ..	110¼-in.
Firebox, length and width	.. ..	266½-in. by 114¼-in.
Tubes, number and dia.	.. ..	92—2¼-in.
Flues	„ „	280—3½-in.
Combustion chamber, length	.. ..	72½-in.
Length over tube sheets	.. ..	22-ft.
Grate area	.. ..	182 sq. ft.

HEATING SURFACES—

Firebox and combustion chamber..	610 sq. ft.
Syphons	262 sq. ft.
Tubes and Flues	6,801 sq. ft.
Total evaporative	7,673 sq. ft.
Superheating	3,219 sq. ft.
Total evaporative and superheating	10,692 sq. ft.

TENDER—

Water capacity	.. ..	21,200 gals.
Fuel capacity	.. ..	27 tons
Wheels dia.	.. ..	37-in.
Journals, dia. and length	.. ..	7-in. by 14-in.

TRACTION POWER—

Eng.	70 per cent. cut-off	..	140,000 pounds
Booster—50	„ „	..	13,400 „
Total	.. ..	..	153,400 „

SPECIAL EQUIPMENT—

Superheater	.. ..	type E
Feedwater heater	.. ..	Coffin
Stoker	.. ..	Standard type B
Syphons	.. ..	Nicholson
Booster	.. ..	Franklin, trailer

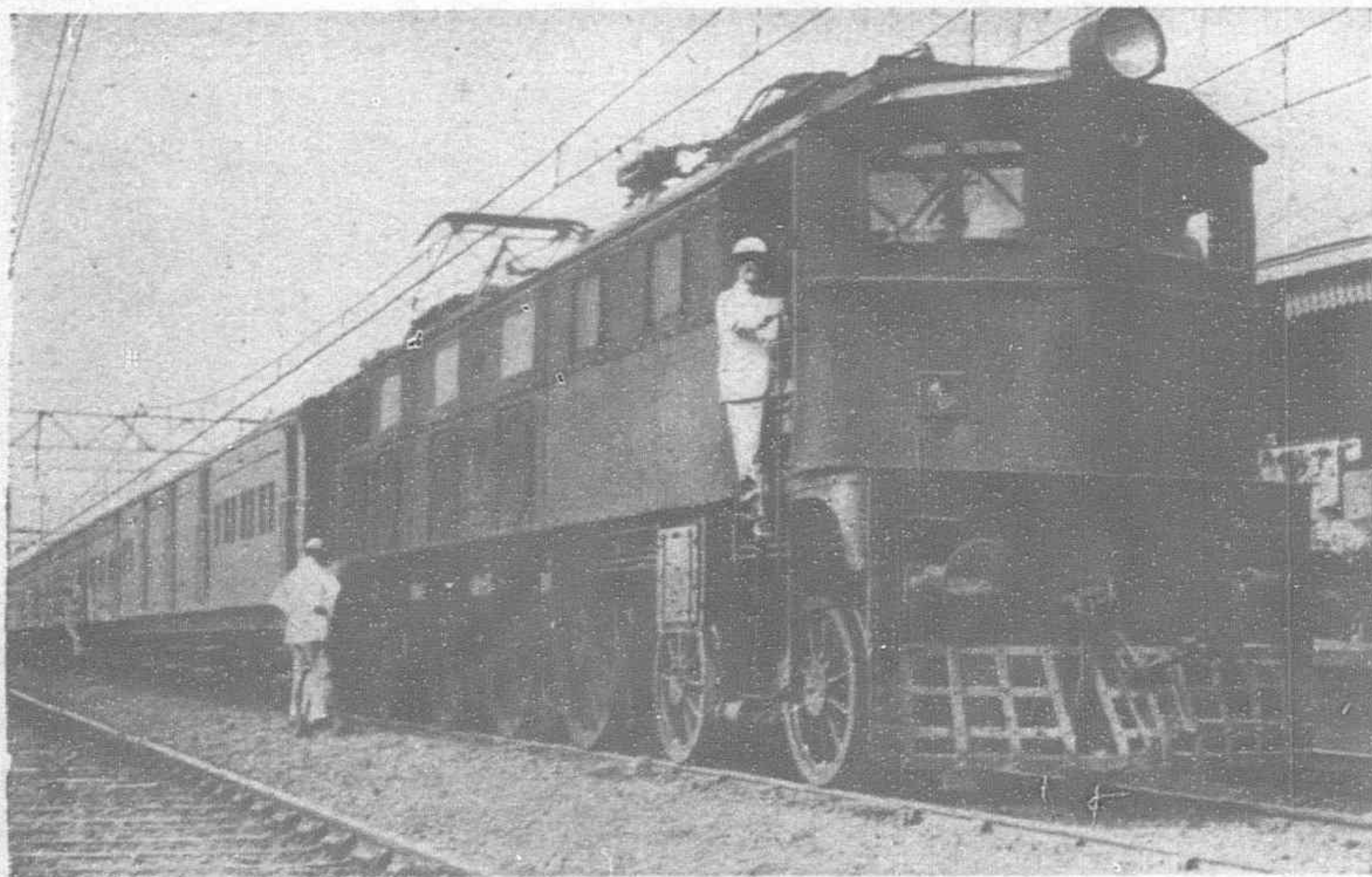
Electric Passenger Locomotives for India

Metrovick Design Secures G. I. P. Railway Contract

AN important contract for twenty-one 2,160 H.P. electric locomotives for express passenger service on the Great Indian Peninsula Railway has been placed with the Metropolitan-Vickers Electrical Company.

The award of the contract is the result of an interesting competition. After consideration of many different designs, both British and Foreign, the G.I.P. Railway ordered three sample locomotives from different manufacturers, designed to the specification of Messrs. Merx and Partners, who are the consulting engineers for the electrification scheme. All three locomotives were delivered and put into service during the past year and it is as a result of extensive trials and tests under service conditions that the present bulk contract has been placed.

The locomotives now ordered are to be similar to the Metrovick sample locomotive submitted, which is shown in the accompanying photograph in service on the G.I.P. Railway.



The New Electric Passenger Locomotive


The design presents many interesting features, especially with regard to obtaining stability at high speeds. The construction is of the 4—6—2 type, consisting of three driving axles, one four-wheel bogie truck and one two-wheel pony axle working in conjunction with the nearest driving axle so as to form virtually a four-wheel truck. The weight of the locomotive is about 100 tons, of which about 60 tons is adhesive weight. In order that as little dead weight as possible shall be carried on the axles, the motors and their gearing are rigidly mounted on the frame of the locomotive and transmit the power of the driving axles through a universal motion flexible link drive which accommodates the route of movement between the axles and frame of the locomotive. All the weight is thus spring borne and the center of gravity is comparatively high so that the truck is relieved from shocks. The normal maximum service speed will not exceed 75 miles per hour but all parts are designed for a speed of 85 miles per hour to provide the necessary margin of safety.

The electrical equipment includes six 360 H.P. motors and electro-pneumatic control gear. The pneumatically operated switches are arrayed in a high tension chamber, those for the line and main resistances being of the single unit type arrayed in groups and those for the motor combinations and reversing being of the cam group type. The units of the control gear are easily replaceable and, together with many of the auxiliaries, are to a large extent interchangeable with the corresponding parts of the Metrovick 2,600 H.P. freight locomotives which are in use on the railway. It will be remembered that a contract for forty-one locomotives of the latter type was placed with the Metropolitan-Vickers Company some time ago.

It is the ultimate intention to operate the passenger locomotives in conjunction with the freight locomotives on the very heavy gradient sections where the railway crosses the Chats. On these gradients, which average as much as 1 in 40 for long distances a passenger train will be assisted by a freight locomotive operating as a banking engine, the characteristics of the locomotives being such that they will operate together with a proper sharing of the load.

Prospects for the Development of Mindanao

By Geo. H. Fairchild

 R. P. J. WESTER, well-known in the United States and in the Philippines as an authority on tropical agriculture, has recently revised the Philippine Bureau of Agriculture Bulletin No. 38 entitled "Mindanao and the Sulu Archipelago. Their Natural Resources and Opportunities for Development."

The first edition came out in February, 1922. The following statement from the revised edition is of interest at this time: "Mindanao is still a comparatively unknown land. Less than half a score of men have traveled widely enough through it to know it even fairly well, and much of the information gained has never found its way into print. Meteorological data are scant for extensive areas. No complete geologic and soil survey has been made. The island is 36,906 square miles in extent, about equal in size to the state of Indiana; it is some 11,600 square miles larger than Ceylon, nearly ten times the area of Porto Rico, and more than three times as large as Belgium. The population numbers less than 800,000 or about 22 to the square mile.

"Climatically, Mindanao is more favorably situated than all the larger islands in the Archipelago to the north. The north-eastern corner excepted, it is below the so-called typhoon belt and in most regions the rainfall is more equally distributed throughout the year than in Luzon and the Visayas."

From the accompanying map prepared by the Bureau of Agriculture, the more or less settled areas in Mindanao and Basilan are indicated by black lines. These areas are planted to the leading crops including sugar cane.

It was under the nominal control of the Spaniards for over 400 years and the development since the Americans took it over in 1898 has been relatively slow.

Of the total area of approximately 10,000,000 hectares, it is conservatively estimated that three-fifths is good agricultural land, but assuming that only 2,500,000 hectares are capable of cultivation to seven essential tropical crops, the following table is suggestive of the potential agricultural wealth of Mindanao: *

Crop	Area in hectares	Yield in metric tons
Rice	400,000	520,000
Coconuts (copra)	600,000	600,000
Rubber	500,000	500,000
Coffee	400,000	240,000
Tea	200,000	270,000
Abaca	300,000	180,000
Sugar cane (sugar)	200,000	1,200,000

According to this report, 1,520 hectares were devoted to sugar cane in the different districts in 1927, from which 1,883 metric tons of sugar were produced in that year:

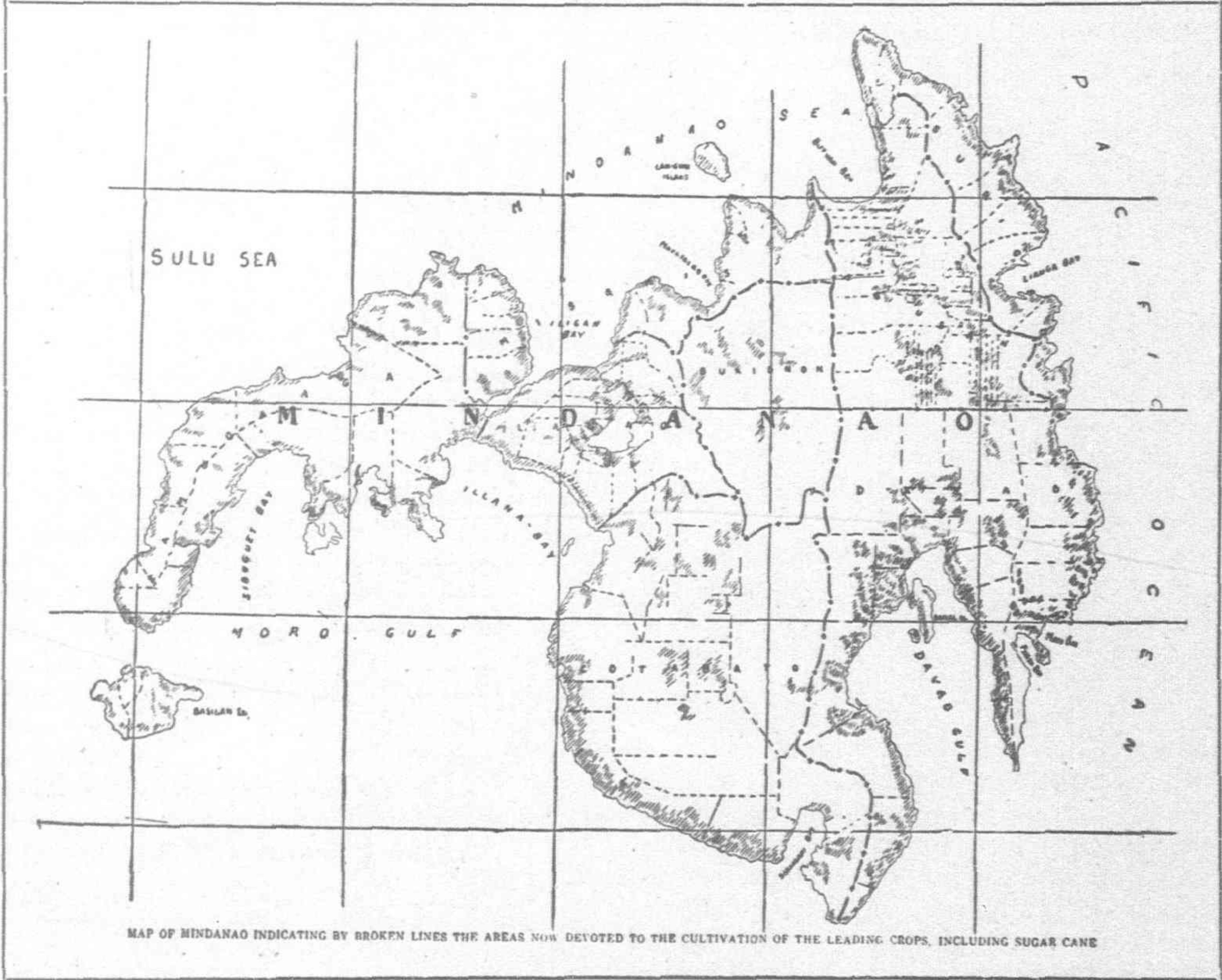
District	Area in hectares	Yield in metric tons
Agusan	180	60
Bukidnon	50	30
Cotabato	170	183
Davao	40	6
Lanao	230	563
Misamis	80	120
Surigao	490	643
Zamboanga	140	170
Sulu Archipelago	140	108
Total	1,520	1,883

Since much of the river valley land is subject to floods, and it is not known as yet whether the weather and soil conditions are as favorable for the production of cane as they are on Negros and Luzon, where cane has been under cultivation on a commercial scale for generations, it is problematical whether all of the 200,000 hectares of land shown in the foregoing table may be found suitable for sugar cane. That sugar cane has not been produced on a commercial scale in Mindanao in the 400 years since it came under the control of European and Americans is evidenced by the fact that less than 2,000 metric

tons of sugar were produced last year, all of which were consumed locally, justifying the assumption that either the soil, weather,

* Noting that Mr. Wester omitted in his report any reference to the production of quinine which is used in large quantities in the United States and which is produced under monopolistic systems by Java, inquiry was made as to the prospects of its production in Mindanao, to which the following reply was received:

"The United States is one of the world's greatest importers of cinchona bark and its derivatives, and its cultivation in one of its own dependencies might therefore be argued. Yet whether or not it would do advisable to attempt cinchona cultivation in the Philippines in competition with the well organized growers of Java remains an open question. That private capital would venture to invest in cinchona culture, an enterprise that requires specialized knowledge which is altogether experimental so far as the Philippines are concerned, and the use of the product of which is comparatively limited, is extremely improbable. Being in a better position to ignore the financial losses that must necessarily result for many years during the course of such work, the Government might consider the introduction of cinchona into the Archipelago with a view of rendering the United States independent of outside sources for the supply of quinine."



population or some other factor is responsible for the relatively stagnant status of the industry in comparison with its development on the islands of Negros and Luzon.

On the assumption that of the 200,000 hectares estimated suitable for cane, 100,000 hectares were planted each year and the yields approximated those now obtained on the islands of Luzon and Negros, say 5 metric tons per hectare, Mindanao is potentially capable of producing 500,000 tons; but assuming that with better varieties of cane and as favorable climatic and soil conditions as are found on Luzon or Negros, Mindanao may, some time in the relatively remote future, produce 1,000,000 tons of sugar annually.

There have been however seemingly unsurmountable difficulties which have prevented the development of the sugar industry in Mindanao and may prove as patent for many years to come, the greatest of which, and the most important factor in successful sugar production, is an abundant and dependable supply of labor. To cultivate 100,000 hectares of sugar cane under the system of tenancy in vogue in the Philippines at three persons to a hectare of land, 300,000 farmers will be needed. In addition to this, approximately 500,000 seasonal laborers to plant and harvest 500,000 tons of sugar will be required. Without the introduction of labor from outside the Philippines, the labor factor presents a seemingly unsurmountable difficulty in the development of the sugar industry on Mindanao.

In this connection, complaints for the first time are being heard on the Island of Luzon of a shortage of labor, due primarily to a large increase in the areas planted to rice, following the introduction of the irrigation systems. With the emigration of laborers to Hawaii and the migration to the adjoining Isabela district to which roads are now being extended, of the surplus population from the congested areas of the Ilocano regions, the sugar Centrals on the Island of Luzon are now for the first time competing for labor due to a 33½ per cent. increase in the sugar crop over last year as a result of the exceptionally favorable weather conditions which have prevailed this year. It has been generally assumed that labor could be recruited in the more densely populated districts of Luzon for sugar production in Mindanao, but with the opening up on Luzon of the Cagayan Valley in the rich Isabela district to homesteaders from the congested districts of the Ilocano regions, the increasing rice production to which Filipinos take more readily than to growing cane and the high wages which attract many laborers to Hawaii, it is not likely that any large number of laborers will voluntarily migrate to Mindanao to raise 1,000,000 tons of sugar.

While it has been the hope of some people that labor from China, Java or some other place might be imported to Mindanao, so long as the local legislator has the power to prevent it, there is no likelihood that the bars against the entrance of Chinese labor will be lowered nor will the land laws be amended to permit of larger corporate holdings than 2,500 acres.

While there is still quite an area on Luzon which could be developed in the Camarines district, also smaller areas in other districts, the difficulties with labor in some districts and the absence of drainage in others, without which only one year out of five years would the crop be profitable, are limiting factors of great importance.

With the present methods of cane cultivation in these Islands, the shortage of draft animals presents another obstacle to a material increase in the present production. At present the shortage of carabaos in Negros has limited to a great extent the cultivation operations of the farmers. It will be many years before the Philippines will make general use of mechanical implements so the problem of draft animals will be a limiting factor in the production of sugar in Mindanao.

If the foregoing observations are found to be based on facts, the justification for the belief and the statement of the proponents of the Timberlake Resolution to the effect that within the life of any one now living, the Philippines will be exporting 5,000,000 tons of sugar, has no creditable basis beyond the reported statement of one of America's foremost men who, soon after the statement credited to him became public, passed away before there was time or opportunity for him to either qualify or explain what apparently was a misunderstanding or misstatement of facts.

With the particular contractual system in vogue in the Philippines, the parties most adversely affected by such legislation as the Timberlake Resolution will be the thousands of Filipino landowners and their tenants. In contrast with the system in vogue in other sugar cane growing countries, where the owners of the sugar factories

also own the land on which sugar cane is grown, in the Philippines the cane lands are owned by small Filipino planters who either cultivate the land themselves or lease them to "inquilinos" or tenants. Under this system a Central may have from 1,000 to 2,000 small independent individual landowners or tenants producing the cane. These small farmers and tenants have been the greatest beneficiaries of the free trade relations between the United States and the Philippines, and will be most adversely affected by such legislation as the Timberlake Resolution should it be passed by Congress.

That during the 30 years of American occupation there has been but an insignificant increase in the extension of lands cultivated to sugar cane, is clearly demonstrated in the history of the development of the Philippine sugar industry. Allowing for the increase in yields per hectare due to the advantages of modern Central facilities, the introduction of modern agricultural implements, the planting of heavier yielding cane varieties, application of fertilizers, the increase in the sugar production of these Islands as a result of the increase in the area of land cultivated to cane is but 17 per cent. If past experiences are reliable indications, then there is no fear that the Philippines including Mindanao will increase its sugar production beyond 1,000,000 tons in the next ten years.

For the past three years, the increase in the sugar production of these Islands amounts to only 14 per cent. in comparison with the increase of 11 per cent. in Cuba, 48 per cent. in Java, 24 per cent. in Hawaii and 65 per cent. in Formosa, as shown in the following table:

COMPARATIVE PRODUCTION OF LEADING CANE-SUGAR COUNTRIES FOR THE LAST THREE YEARS.

(In long tons of 2,240 lbs.)

Year	Cuba	Java	Hawaii	Formosa	P. I.
1926-27	4,508,521	1,939,948	724,403	399,241	526,358
1927-28	4,011,717	2,359,050	788,000	556,325	565,634
1928-29	*5,000,000	2,903,000	900,000	658,968	605,283
Increase in 3 years	491,479	943,052	175,597	259,727	78,925
Per cent. increase in 3 years	11%	48%	24%	65%	14%

It is apparent from the foregoing table that the reason for the depression in the sugar market, which Senators Smoot and King attributed to the free entry of Philippine sugar, is the excessive increase in the sugar production of Java and Formosa. As a result of the increased sugar production of Formosa, Japan is rapidly becoming independent of sugar from either Java or Cuba, necessitating the marketing of Java's surplus to Europe where Cuba has been marketing the balance of its crop which cannot be absorbed in the United States, amounting to about 1,500,000 tons.

* No reliable estimate is yet given out; may reach 6,000,000 tons.

The Harbin Main Shops of the Chinese Eastern Railway

(Continued from page 232)

OUTPUT OF PASSENGER CARS AFTER CAPITAL REPAIRS AND ORDINARY REPAIRS AND YEARLY INSPECTION WORK

Years	Capital repairs	Ordinary repairs	Yearly inspection
1922 4-axl. cars	.. 27	10	116-axl.
" 2 " "	.. 57	19	78-axl.
1923 4-axl. cars	.. 31	6	82-axl.
" 2 " "	.. 41	15	54-axl.
1924 4-axl. cars	.. 21	10	254-axl.
" 2 " "	.. 25	18	76-axl.
1925 4-axl. cars	.. 14	13	248-axl.
" 2 " "	.. 24	14	80-axl.
1926 4-axl. cars	.. 11	18	292-axl.
" 2 " "	.. 32	24	122-axl.
1927 4-axl. cars	.. 13	11	318-axl.
" 2 " "	.. 63	45	134-axl.

OUTPUT OF FREIGHT CARS AFTER THREE YEARS SERVICE INSPECTION

Years	Cars	Units	Years	Cars	Units
1922 ..	2,138	2,392	1925 ..	1,220	1,644
1923 ..	1,990	2,077	1926 ..	1,987	2,410
1924 ..	1,650	1,771	1927 ..	1,848	2,341

Engineering Notes

ELECTRIC LIGHT, POWER AND TRACTION

SANYO CHUO SUIDEN K.K. (Sanyo Chuo Hydro-electric Co., Ltd.).—The Sanyo Chuo Suiden K.K. has ordered a turbo-generator with a capacity of 35,000 k.v.a. (Price about Y.1,000,000 Discount Y.140,000) from Mitsubishi Denki K.K. and another from Metropolitan-Vickers.

It is reported that orders for transformers and switchboards have not yet been decided upon.

HOKKAI SUIRYOKU DENKI K.K. (Hokkai Hydro-electric Power Co., Ltd.).—The Hokkai Suiyoku Denki K.K. has decided to improve the equipments of Teizankei No. 1 Power Station, work to be started in the near future. The two generators, now installed there, capacity 400 k.w. are to be replaced and the way also to be improved.

The cost of these improvement is estimated at some Y.300,000. The capacity will be increased to 1,500 k.w., it is reported.

CHOSEN CHUO SUIDEN K.K. (Korea Central Hydro-Electric Co., Ltd.).—License has just been granted for a new electric power company in Korea, to be known as the Chosen Chuo Suiden K.K., with a capital of Y.3,500,000. The chief promoter of this firm is Mr. Takenosuke Ogura, the president of Daikyu Denki K.K. The plan of this company is to develop water power on the Gento River, on the upper reaches of Moshuinsen River in Zenra Hokudo. The stream of Gento River is to be dammed, thereby producing an effective head of 900 ft., power capacity estimated at 5,000 k.w.

INABA SUIRYOKU DENKI K.K.—The Inaba Suiyoku Denki K.K. capitalized at Y. 2,000,000 is affiliated with Nippon Denryoku K.K. It has just begun the construction of its No. 1 power station with a capacity of 2,268 k.w., on the Hatto River, at Sakuraba in Tottori Prefecture.

Cost of construction is estimated at Y. 1,000,000, to be completed in September, 1930. This works out at about Y.441 per kw.

The power generated is to be supplied to the Sanyo Chuo Suiden K.K. It seems strange that this company can not take care of its own power requirements without continuing to buy from other concerns.

RAILWAYS

TO MAKE S. M. R. CO. A PRIVATE CORPORATION.—Tokyo wires that President Yamamoto of the S.M.R. Co. has proposed to Premier Tanaka to transfer the S.M.R. Co. from the present semi-Government to purely private management, removing all supervising authority over the Company's Directorate, and to increase the present capital of Y.440,000,000 to Y.1,000,000,000, the Government assets in the Company including both capital and share capital being repaid by annual instalment.

TENDERS FOR PURCHASE OF RAILS AWARDED TO JARDINE ENGINEERING CORPORATION.—Tenders for the purchase of rails and parts amounting to twenty-eight thousand gold dollars (\$G.28,000) for the Shanghai-Hangchow-Ningpo Railway has been awarded to the Jardine Engineering Corporation. The report of the award was submitted by a Committee composing of technical experts and other staff members of the Ministry of Railways. Telegraphic instructions approving the purchase of three new locomotives for the Canton-Kowloon Railway Administration. The Kwangtung Provincial Government was also requested to assist in carrying out the transaction. The Tientsin-Pukow Railway Administration has also decided to purchase sixty thousand sleepers from America, exemption from import duty on which has already been granted by the Ministry of Finance.

NEW NAME OF PEIPING-MUKDEN RAILWAY.—The Peiping-Mukden Railway will hereafter be known as Liaoning-Peiping Railway, according to a mandate of the National Government.

NEW VIADUCT IN SIAM.—The King of Siam opened the new viaduct spanning what was formerly a dangerous railway crossing near Hua Lampong terminus on April 8. The structure cost 225,000 ticals.

NEW RAILWAY LICENSED IN JAPAN.—The Department of Railways has granted a license for a new electric railway, Yoro Denki Tetsudo, mileage five miles and 40 chains, section from Sumimata Machi, Anpachi Gun to Kiyota Machi, Gifu City, Gifu Prefecture.

ROLLING STOCK.—The Ministry of Railways has requested the Military authorities to allow the Ministry to convert the armored cars and armored locomotives formerly used for military transport on the Kiukiang-Nanchang Railway into regular passenger and freight cars and service locomotives respectively for ordinary traffic. It is learned that steps are being taken by the Military authorities to comply with the request.—*Kuo Min.*

TOKYO CHIKA TETSUDO K.K.—(Tokyo Underground Railway Co., Ltd.)

The Ueno-Manseibashi Line now under construction is expected to be opened some time during October this year, which is about two months earlier than the original schedule. The construction has already been completed for 80 per cent. and the installation of rails was started from April 10. The fare will be 10 sen average, to connect with Ueno-Asakusa Line which is in operation at present.

The third part of construction, Manseibashi-Kanda Station Line, commenced on April 1.

NEW TSITSIHAR-KOSHAN RAILWAY.—On the new Tsitsihar-Koshan Line, rails have already been laid from Tsitsihar up to Tahaer, 29 kilometres in distance. Construction supplies for the next section are now being transported. The 98 kilometre section from Tahaer to Taianchen, the earth work has already been finished, and rails are now being laid.

Then, again, in answer to the wishes of people of the Paichuan district, a branch line is to be built, deviating from Taianchen over the distance of 90 kilometres to Paichuan, work being taken up on the return of the thaw.

15 CHINESE RAILWAYS PLANNED.—In order to carry out the proposed construction program which provides for the building of two thousand miles of railway each year for the next ten years, the Ministry of Railways is making plans for the construction of 15 short railway lines to be finished in the next six years. Sepecial investigators have already been despatched to investigate economic and geographic conditions in the various districts which the proposed lines will traverse as a preliminary step to the determination of the exact course of the railroads.—*Kuo Min.*

NEW KIRIN-HAILUNGCHENG LINE.—The Kirin-Hailungcheng Line construction work has progressed as far north as 27.8 kilometres south of the city of Kirin. Originally, the entire building work was expected to be finished by the end of the current month, but a few rivers, including the Enteho, have got to be bridged over, and, the rise of the river water from the thaw is retarding the work. Moreover, the rails on hand are found short, and the return of rails enough for 13 kilometres, as rented to the Mukden-Hailungcheng Line, was demanded, but the demand is not yet acceded to. Then, the bridge building supplies on hand are found insufficient.

NEW CHEKIANG RAILWAYS.—The Province of Chekiang will be laying down tracks for three inter-provincial railways with Hangchow as the central point, if plans completed by Mr. Cheng Ching-chun, Provincial Commissioner of Reconstruction, can be carried out. The proposed lines will be the Hangchow-Nanchang, Hangchow-Focchow and Hangchow-Anking lines. The project is now under consideration by the Chekiang Provincial Authorities and will be submitted to the State Council for sanction.—*Kuo Min.*

INDUSTRIAL

MINAMI MANSU TETSUDO TO BUILD A STEAM POWER STATION.—It is reported that the South Manchuria Railway Co., Ltd. has decided to build a steam power station at Anshan with a capacity of 50,000 k.w. The power is to be used for manufacturing pig iron (400,000 Tons.) and sulphate of Ammonia.

The construction cost is estimated at some Y.100 per 1 k.w. total cost Y.5,000,000.

ONODA SEMENTO K.K. (ONODA CEMENT CO., LTD.)—Preparations are being made for the construction of two new mills, one in Miye Prefecture at Faruta Mura, capacity 100,000 barrels a month, another in Korea with a capacity of some 60,000 barrels a month. For the Miye Mill the company is negotiating for the purchase of site, in secret. The plan is attracting the attention of the industry, because of the large size of new mills.

NEW CEMENT MILLS.—The Nishi Tama Mill of Asano Semente K.K. (Asano Cement Co., Ltd.) has just been completed and put in operation, capacity 80,000 barrels a month. Another mill of Nanao Semente K.K., known as Nanao Mill, capacity 70,000 barrels a month, has also been completed and is to be put in operation some time this month.

There is some apprehension in the market that, in case the output from these mills begin to appear on the market, it may weaken the market to some extent. This apprehension is denied by experts, because the output of these mills is of a quality different from ordinary Portland cement, being a better quality of cement. In addition, the demand for this year is estimated at 15 per cent. more than last year and, in view of the present condition of the market, a reduction in the rate of production limitation—from 26 per cent. to 20 per cent.—is suggested for June/July/August.

ACETIC ACID PLANT IN JAPAN.—The Japanese Synthetic Chemical Laboratory at Ogaki, Gifu Prefecture, which was established some time ago with a capitalization of Y.200,000, recently was taken over by the Mitsui interests, who raised the capitalization to Y.1,000,000.

Up to now 80 per cent. of the total demand of Japanese acetic acid has been supplied through the hands of the Mitsui interests and now they have control of the entire supply.

Japan has been making a study of the manufacture of synthetic acetic acid for many years and the national Treasury gave subsidy of Y.30,000 for its encouragement last year. Although Japan has succeeded in manufacturing synthetic acetic acid of an excellent quality, the monthly output is only 10 tons at present.

The Japan Synthetic Chemical Laboratory will complete its new factory by next August and new machines will be installed in October, so that trial operations will take place within the year. The laboratory expects to supply 90 per cent. of the domestic demand for acetic acid.

The Japan Synthetic Chemical Laboratory is the only establishment that uses the synthetic process of manufacturing acetic acid, carbide being used as the pivotal point of the process. The Government has also decided to grant Y.30,000 toward the encouragement of the industry this year.

OKURA GUMI TO MANUFACTURE MOTOR CARS.—The plan of Okura Gumi to manufacture motor cars has been attracting the attention of the industry. Researches have been carried on at the laboratory of Nippon Jidosha K.K., a subsidiary of Okura, since 1926 and the original construction plan has been revised for more than 20 times. Now they have just completed a final plan for two kinds of cars and two samples are to be made at the company's Nakano Works. It is to be noted that the two cars will be for passenger service.

Details of the completed plan are not available, but it is reported that one of them is to have eight cylinders and the other six cylinders, diameter of cylinder more than three inches each, horse-power to be 20 h.p. or more. It is also reported that the Omori Works will be used for the purpose, instead of Nakano Works.

It will be some time after the summer that the first cars will be completed, as they must instal the necessary machines before starting operations.

FORD MOTOR CAR COMPANY.—The Ford Motor Car Company is trying to buy lumber from Hokkaido for use in its mills in America, it is reported.

The company is experiencing a shortage of supply of lumber for building car bodies, due to an enormous increase in sales and has sent three representatives to Japan to look for suitable supply. These representative have found a few species of timber suitable for their purpose, in the Hokkaido, known as Buna (or beech). The forest they have discovered is located at Ochibe Mura, Ashiho Gun, Oshima Province in the Hokkaido, owned by the Imperial Forest Bureau. The forest land covers an area of some 12,000 cho.

Negotiations are now being carried on for a purchase contract, with the Department of Imperial Household. A transaction of some 50,000 koku of lumber a year for ten years, is expected to consummate. When this contract is closed, the Ford Company will build a railway from the forest to Ochibe Beach, so that the lumber may be transported directly from Ochibe sea coast to the United States.

YING TAK CEMENT FACTORY.—The Government of Kwangtung feel confident that the projected cement factory at Ying Tak on the North River will be a very profitable concern. They hope in fact to clear roughly \$1,920,000 per annum.

The contract for the construction of the factory and for its machinery and general equipment has been given to the F. L. Smith Co., of Copenhagen, who are authorized to import machinery at the cost of £180,000 from Denmark.

It is estimated that the output of the factory will be 1,200 barrels, or 200 tons, a day. About 320 tons of raw material, of which 240 tons will be limestone, and 80 tons, clay, will be needed per day.

The anticipated expenses per day, as calculated by the contracting Company, will be as follows:—

Limestone—240 tons at 50 cents ..	\$120
Clay—80 tons at 35 cents ..	28
Coal—Kiln about 60 tons at \$16 ..	960
Power about 14 tons at \$25 ..	350
Gypsum—3 per cent, 6 tons at \$30 ..	180
Labor—200 unskilled at 80 cents ..	160
75 skilled fitters at \$2.50 ..	187
Supervision and Management per month about \$4,500—per day therefore ..	150
Depreciation 8 per cent. and Interest 8 per cent. on H.K. \$1,800,000 per day ..	1,020

Total \$3,155

The manufacturing cost per barrel is estimated from these figures as \$2.63, to which 17 cents are added by the contractors to cover possible additional costs. This brings the cost price to \$2.80 per barrel, and together with the cost of barrel to \$3.60. If packed in bags the cost price would be \$3.35.

The present selling price is \$8.50 per barrel, which means a net profit to the Government of \$5 per barrel.

YOKOHAMA DOKKU K.K. (YOKOHAMA DOCKYARD CO., LTD.)—After prolonged negotiations with C. Illies and Co. the Yokohama Dokku K.K. has succeeded in securing the manufacturing rights for Mann oil engines. In consequence of this contract, the company is to buy new machines for manufacturing engines. Mr. Fujimaro Tsuchiya, engineer, will be sent abroad to make investigations as to what machines to be used, as well as for studying the engineering technique necessary for manufacturing these engines.

SHIPPING AND SHIPBUILDING

NEW N. Y. K. VESSEL.—The *Tatsuta Maru*, a new steamer destined to go into the Pacific service of the Nippon Yusen Kaisha, slid off the ways at the plant of the Mitsubishi Dockyards Company in Nagasaki, April 12.

The order for the new steamer was placed with the building company by the N. Y. K. in 1927 and actual construction commenced on December 3, of that year. The ship is expected to be ready for service by March 15, 1930, and the owners intend to place it on the San Francisco run.

The *Tatsuta Maru* is 584 feet in length, has a beam of 72 feet and a depth of 42 feet 6 inches. It will draw 28 1-2 feet and have a displacement of 16,800 tons. Four engines of 1,600 horse-power will turn four screws to drive the craft through the water at an average speed of 19 knots.

The steamer will have seven decks and accommodations for 820 passengers. Of these 220 will be first cabin accommodations, 100 second class and 500 steerage (See Article on the Nagasaki Works in this issue).

N. Y. K. NEW FREIGHT BOATS.—A superior freighter construction program following the extensive passenger boat plan has been decided and announced by the Nippon Yusen Kaisha. The new plan involves the building of four Diesel-engined ships each of 10,000 tons. These ships will be placed mostly on the New York cargo service.

The plan is reported to have been adopted by its board of directors but the method of raising necessary funds has not yet been definitely decided. It will take about Y.10,000,000 or Y.12,000,000 to complete these ships. The company's paid-up capitalization is Y.64,250,000 for which it has already issued debentures amounting to Y.60,000,000, leaving not much room for the issue of more debentures.

The company is not likely to borrow money from the banks but will call in unpaid shares to the amount of Y.14,000,000 it is reported. The second calling in of new shares totalling 1,520,000 with Y.12.50 each will be done, subject to the approval of the directors.

The company now employs 12 steamers which operate the New York service 24 times a year. It attaches more importance to the New York service than all other freight lines abroad. Six of these ships will be discarded from the service, to be replaced by the new superior ships on their completion. These four new ships are to operate the service 16 trips and the remaining six old ships 12 trips a year.

On the completion of these ships the company is likely to improve the present old freighters on its London, Liverpool and other foreign services by means of new ships. The present steamers engaged in the New York line have slow speed and the maximum speed is only 12½ knots an hour while that of foreign ships on the same line ranges from 14 to 15 knots.

LAUNCH OF THE "HSIN YANG MARU."—The Shanghai Dock and Engineering Co., Ltd. successfully launched from their Pootung Shipyard yesterday afternoon the new steel twin screw *s. Hsin Yang Maru* built to the order of Messrs. Nisshin Kisen Kaisha for their passenger and cargo service between Hankow and Ichang. The vessel is an improved type of the *Tang Yang Maru* built and engined by the Dock Company for the same owners two years ago. She is 246-ft. long by 40-ft. broad and designed to carry 1,000 tons deadweight on 8-ft. 8-in. draft, and constructed under the survey of the

Japanese Government surveyors and British Corporation and will be classed in this Society for their special river class. On the saloon deck a large and luxuriously appointed saloon with four two berth state rooms is placed forward for first class passengers, while amidships are five two berth cabins for Chinese first class and five four berth cabins for Chinese second class passengers, also rooms for chief comradore, stewards and pilots; and spacious accommodation for 152 Chinese third class passengers is placed aft. On the bridge deck are large comfortably appointed rooms for the captain, officers and engineers aft of the wheel house. The propelling machinery constructed in the Dock Company's workshops consists of two sets of triple expansion surface condensing engines, supplied with steam from one large and one small cylindrical multitubular boilers fitted with Howden's system of forced draft and built to survey requirements for a working pressure of 200 lb. per square inch. The auxiliary machinery includes Weir's independent vertical feed pumps and direct contact feed heater; a separate combined set of air, circulating, feed, bilge, and sanitary pumps driven by a compound vertical engine, one 15 K.W. electric generating set driven by a compound steam engine, searchlight projector, Hastie's steam steering gear operated by Mc-Taggart Scott's telemotor gear from the bridges, Emerson Walker steam windlass and capstan on saloon deck forward and steam capstan on saloon deck aft.

MINING

IPO MINING COMPANY.—The Ipo Mining Company, organized last week by members of the Atlantic, Gulf and Pacific Company, will begin actual operations today for the development of the newly found gold field near the site of the Bicti-Ipo tunnel of the Metropolitan Water District in Bulacan province.

George Cushing who discovered the new gold strike, has been employed as superintendent of development work. Mr. Cushing has been a mining engineer for a number of years and has been employed for the past nine months by the Atlantic, Gulf and Pacific Company as tunnel foreman of the Ipo end of the Bicti-Ipo tunnel. Another man will be sent to Ipo to take his place.

Some prospecting work already has been completed on the 540 hectares of land on which gold claims have been filed. A number of trenches have been dug following gold-bearing veins and one cross tunnel and one shaft are being driven.

Mr. Cushing plans to systematically prospect the entire area. Laborers have been hired and are on the location ready to go to work. Before the wet season begins Mr. Cushing hopes to know definitely the extent of the strike, its value, and to lay out a location for a mill.

Mr Cushing believes that an extensive field of gold is being opened up. He has panned the earth over a considerable area and says that he has found gold practically everywhere.

AVIATION

DAIREN SEOUL AIR MAIL LINE.—Aviator S. Inui with his colleague, Y. Mino, who have been assigned to the air station of Choushuitzu (Dairen) stated the following:—

The two Salmson planes, loaned from the Tachikawa military aerodrome, have already been shipped from Yokohama. They will be assembled on their arrival at Dairen. The re-erection work will be simple, because all there is to be done will be to assemble the wings. The aviators intend to carry out a trial flight to Seoul and back before the 28th inst.

The regulation air track between Dairen and Seoul is to fly from Dairen north to Chinchou then to pass over Pitzuwo eastwards to above Shinto Islet in the mouth of the Yalu, then turning in a bee line to Pingyang whereat to alight, then resuming the flight to Seoul.

By the relay system, Aviators Onuma, Kanaya, and Matsui stationed at Seoul will carry the mails and parcels to Urasan where they are to be taken to Fusan by motor car, and then to be consigned by the Channel steamer for Moji.

They will be taken to the Tachiarai aerodrome and then be carried east to Osaka and Tokyo.

The entire Dairen-Tokyo air route will be over 2,000 kilometres. The Dairen-Seoul section is about 650 kilometres. Supposing the mails, etc. are put on board a plane this morning, they will get to Tokyo to-morrow evening.

The Dairen-Seoul section is regarded as the best of all, because of its air currents being controlled by a sort of Continental periodicity, what risk to be run being the smallest. This section, too, is thought to bring out what good points an aeroplane may have to the most effective play. A flight to Seoul will take something like 5 hours. Air journey, unlike being rocked from side to side on board a ship at a heavy sea, is the more comfortable, except when buffeted sometimes by a gust of wind.

The new Vokkers are expected at Yokohama in the middle of April. One is of the Superuniversal type seating 8 people, inclusive of the pilot. The other is triple-engined with a seating capacity for 10, including the pilot. These Vokkers will be assembled at the Tachikawa aerodrome.

In passing, the Communications Ministry is prepared to grant Y.20,000,000 to the Japan Air Traffic Co. which is to run the new Dairen-Tokyo air line, extending over ten years, and is capitalized at Y.10,000,000.

Maj. H. Mugita, Air Station Master, Choushuitzu (Dairen) of the Japan Air Traffic Co., served on the staff of the Army Air Board till he joined the Air Traffic Co.

He remarked:—

Some Japanese appear depressed at the notion that the Japanese air circle is lagging far behind the West, but they are wrong. In Japan, a profound study has been under prosecution on the basis of the finest aeroplanes turned out in the senior West and she is manufacturing superior planes, in which not only the best points of the Western machines are fully blended, but also further improvement contrived in Japan are embodied.

As regards the pending trans-Pacific flight, competent airmen and adequate machines are both already available, but the proposition has not yet matured only because of the meddlings of lay people.

We hear the Japanese air currents commented upon as specially dangerous to aviation, but from my personal experience, such is not the case. Especially in Chosen and South Manchuria, they are in a favourable condition, and the new Tokyo-Dairen route may be claimed as absolutely safe.

The use of the Vokkers, each fitted with three engines, that will be ready to start passenger traffic next July, will eliminate all possible risk in passenger traffic.

In these two years, during which the Tokyo-Osaka air line has been maintained, not an accident has taken place.

It will be wise for all parties concerned to inaugurate the postal line to familiarize the airmen concerned with the local peculiarities, before starting passenger business.

We should like to impress upon the general public the perfect safety of a flight journey.

(Engineering Notes Continued on page 240).

For Quicker and More
Economic Deliveries
ship via the

SEATTLE

Short Route ...

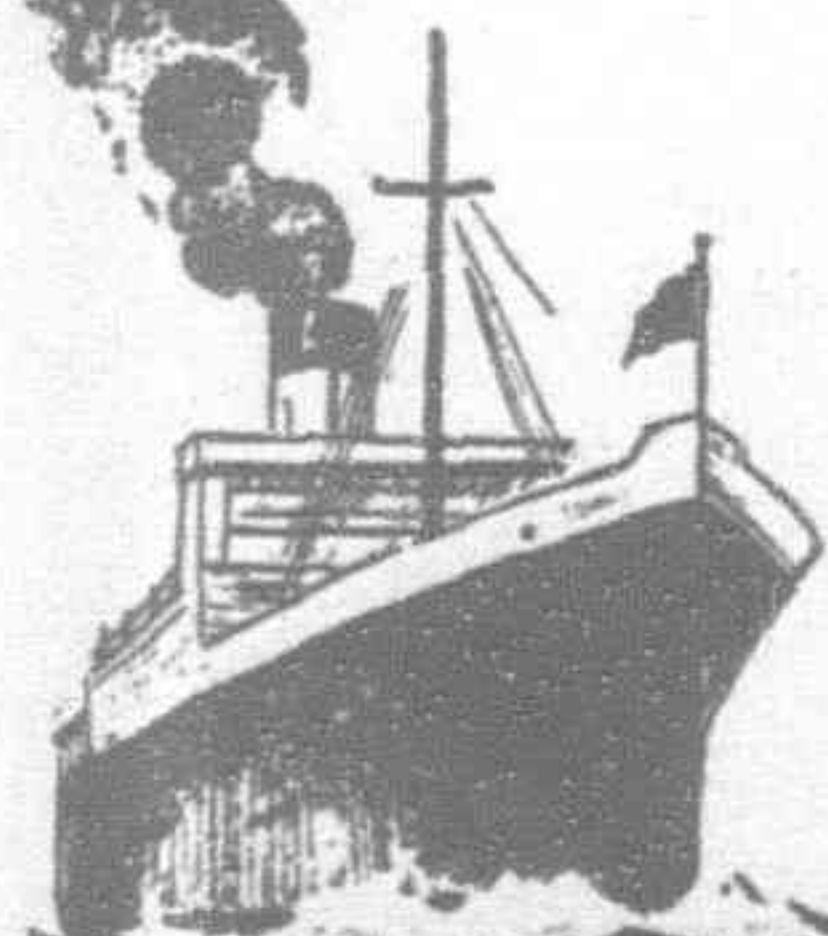
Ship via
Public
Terminals

WITH competition keen, the economy of shipping via the Port of Seattle is a wise measure in insuring a profit. Here are the advantages: Low Storage Rates, Low Insurance Rates, Low Handling Costs. Ample berthage is always available and six trans-continental railways offer unexcelled transportation facilities. Cargoes are transferred direct from ship to car and vice-versa, insuring dispatch and protection against loss.

Satisfactory Service at Minimum Cost.

Write for copy of the Port of Seattle Year-book—it contains much information and data valuable to traffic managers, manufacturers, exporters, importers, and others interested in trading with the Orient. It's free for the asking.

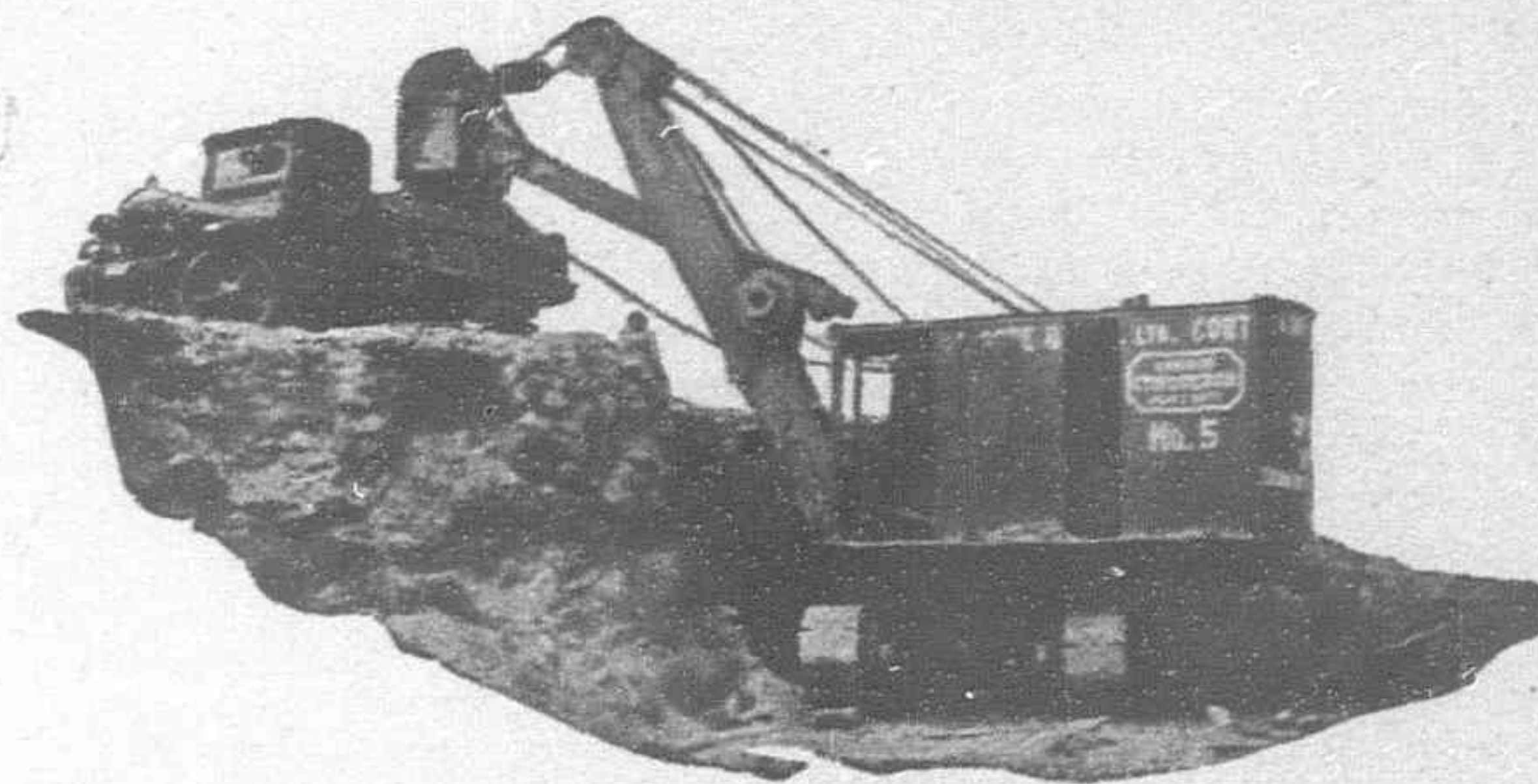
Traffic Department, Bell St. Terminal
Seattle, Washington



The PORT OF SEATTLE
GATEWAY TO AMERICAN MARKETS

OSGOOD

Shovels, Back Hoes, Draglines,
Clamshells, Cranes
Steam—Petrol—Electric



A MAGIC TOUCH OPERATES OSGOODS

The pull of one finger is all that is needed to set the clutches on an Osgood. "Servo," the powerful control mechanism, makes the motor do the work. Because Osgoods are so easy to run, operators do not tire. They can work faster and turn out a much greater quantity of work. Get acquainted with Osgoods. Write for catalogue.

The Osgood Company, Marion, Ohio, U.S.A.

Cables: "Osgood, Marion, Ohio"
All Standard Codes

3

The Modern Genie



of Aladdin's Lamp!

THE GENIE OF ALADDIN'S LAMP

Rubbing a lamp placed at the service of Aladdin, a genie, who was a wonderful magician. As remarkable as any magic of the Arabian nights are machines science has given to the world of to-day. They remove mountains, build islands, dam rivers, and unite oceans. Famous on Panama Canal, Welland Canal, Sukkar Barrage, Sudan irrigation and a host of other great earth moving projects are Bucyrus-Erie excavating machines. And there is a Bucyrus-Erie to handle your digging speed production and save you money. But like Aladdin you must rule the lamp—ask for one of our experienced engineers who can discuss your excavating problem.

BUCYRUS-ERIE COMPANY.

Head Office:
South Milwaukee,
Wis., U.S.A.

**BUCYRUS
ERIE**

Trade Mark Registered
Distributors:

India:
McLEOD & CO.
Calcutta.

Siam:
THE BORNEO
CO., LTD.
Bangkok.

Japan:
MITSUI & CO., LTD.
Tokyo and principal
cities of Japan

London Office:
Bucyrus-Erie Co., Ltd.,
Windsor House,
83 Kingsway, London,
W. C. 2, England.

AN AMERICAN 'PLANE FOR YUNNANFU.—Under the supervision of Mr. Earl F. Baskey, the representative of Messrs. L. E. Gale & Company, Shanghai, the Agents for many large Aeroplane Manufactures in America, a Ryan B. 1 Mahoney Monoplane has been assembled at the Kai Tack Aerodrome, Kowloon City for the Yunnanese Government. Several trial flights have been made and the plane has shown itself satisfactory in every detail.

The Ryan B. 1 monoplane which is being sold to the Yunnanese Government might be called a real luxury plane. The interior might be compared to an expensive car. The machine looks very handsome with its aluminium finish, and polished duraluminium engine cover. The plane is fitted for five passengers and has purple velvet lining throughout the cabin, in which the seats are titled like those of a motor-car.

The body is constructed of steel tubes and fabric covering. The engine is a 220 H.P., 9 cylinder Wright Whirlwind motor, which has made history for itself. The "Triplex" windows on each side of the cabin may be moved at the pleasure of the passenger and the cabin is completely cowled in. Two wide doors are provided on each side. The machine has a steel propeller, and Gruse Aero Shock absorbers which work very efficiently. The wings have the "Clark Y. Wing curve" which is said to have exceptional lifting powers. The petrol fuel is carried in both wings eliminating all fumes from the cabin. Another feature is the wheel fitted to the tail, and mounted on a rubber shock absorber, used instead of a dragging stick. The use of this is made possible by the brakes fitted to the wheels. The plane can land on a very small field. Throughout the plane, inspecting flaps are fitted with "Lightning fasteners," which makes inspection of the control cables and rear tail mechanism a short job. The machine costs \$14,500 Gold.

TELEPHONE, TELEGRAPH AND RADIO

BROADCASTING STATIONS IN JAPAN.

—A report by the Commercial Counsellor and the Acting Commercial Secretary, H. M. Embassy, Tokyo, to June 30 last, states that Japanese stations maintaining communication with foreign countries are now four in number. The Tokyo station (formerly known as the Iwaki Radio Station), which has sub-stations at Haranomachi (sending station), Tomiokacho (sending and receiving station), and Fukuoka mura (receiving station), and the Ochiishi station (sending and receiving), near Nemuro, maintain communication with the American Continent. Communication with Europe is maintained by the Osaka station (Sumiyoshi ku), and by the Nagoya station, which has sub-stations at Kaizo mura (receiving station) and Yosami mura (sending station). The Nagoya station has been recently completed (June, 1928), with the help of German engineers, and is intended for direct communication with Nauen, Ste Assise, Warsaw and other European stations. Radio telephony is in use at Kobe and Moji between the shore and ships in harbour, but has not yet further developed.

PUBLIC WORKS

NANKING HARBOUR ADMINISTRATION.—A project for the improvement of harbour administration in the various coastal ports of the country has been jointly formulated by the Ministries of Foreign Affairs, Communications, Industry Commerce and Labour, Interior, and Railways and submitted to the State Council for consideration and sanction. The salient features of the scheme are as follows:

1.—A national harbour administration committee shall be established to supervise the harbour administration of all important sea ports.

2.—The proposed committee to be composed of the Ministers of the following eight Ministries: Communications, Finance, Navy, Railways, Industry Commerce and Labour, Foreign Affairs, Interior and Public Health, with the Minister of Communications as Chairman.

3.—Harbour administration bureaux to be established at all important coastal harbours, bays and commercial ports, to attend to harbour affairs within their respective spheres in accordance with instructions from the national harbour administration committee.

4.—Naval bases not to be included among the harbours under the direct jurisdiction of the national harbour administration committee.

5.—All harbour affairs heretofore taken charge of by the naval headquarters or the customs administration to be handed over to the new national committee for control.

6.—Regulations governing the organization of the national harbour administration committee and branch harbour administration bureaux to be separately formulated.—*Kuo Min.*

THE ABERDEEN WATER SCHEME.

The Hongkong Government has decided to proceed immediately with the Aberdeen reservoir scheme. After protracted negotiations the Government has secured a resumption of certain water rights held by the Taishing Paper Manufacturing Co., and they have in mind the construction of a new reservoir, near the present Pokfulam reservoir. It is hoped to secure an extra 2.12 million gallons a day by this scheme which will cost about \$2,600,000 and should, if all goes well, be completed in three years time.

There is at present estimated to be 90 days' supply of water on the Island. The harbour pipe line, it is hoped, will be completed by the end of the year.

BRIDGE ACROSS YANGTZE UNDER PLANNING.—According to a proposed project of the Ministry of Railways, a steel bridge to span the River and connect Hankow with Wuchang will be constructed as soon as funds therefor are available. The bridge will be about thirty-five feet in width and consist of over fifty sections. Besides bearing a double track for the trains on the Canton-Hankow Railway, there will be sufficient space for motor traffic. The estimated cost of the construction will be twenty million dollars (\$20,000,000).

PORT IMPROVEMENT IN CEBU.—A contract will shortly be awarded for the construction of a concrete pier for Cebu, capital of the island of the same name, Philippine Islands, according to Trade Commissioner G. C. Howard, Manila. The principal items of the contract include a reinforced concrete pier 155.45 meters in length and 33.3 meters in width, supported by 615 reinforced concrete piles. A reinforced concrete marginal wharf is also to be erected, 198.39 meters in length and 18.10 meters in width, supported by 338 concrete piles. The project is to cost 1,111,650 pesos (\$555,825) and the time required for completion is 750 days.

BIG IRRIGATION CANAL TO COST Y.1,709,500.—At a cost of Y.1,709,500 a canal for irrigating the fields in the Aichi (Naguyce) prefecture to the extent of some 39,200 acres, which will be the largest in the country, will be started soon.

It is believed that the canal will relieve some 400,000 farmers of the region of their anxiety over water scarcity during dry summers.

The work is to be undertaken by the Miyata Yosui Futsu Suiiri Kumiai, or the Miyama Irrigation Union, and is to be subsidized by the Home Office and the Agriculture and Forestry Office to the amount of Y.941,750 and Y.383,875 by the Aichi Prefecture.

According to the plan, a large dam will be constructed across the main stream of River Kiso at a cost of Y.522,000, and a canal extending two miles, as far as the town of Miyata, will be dug.

ROADS

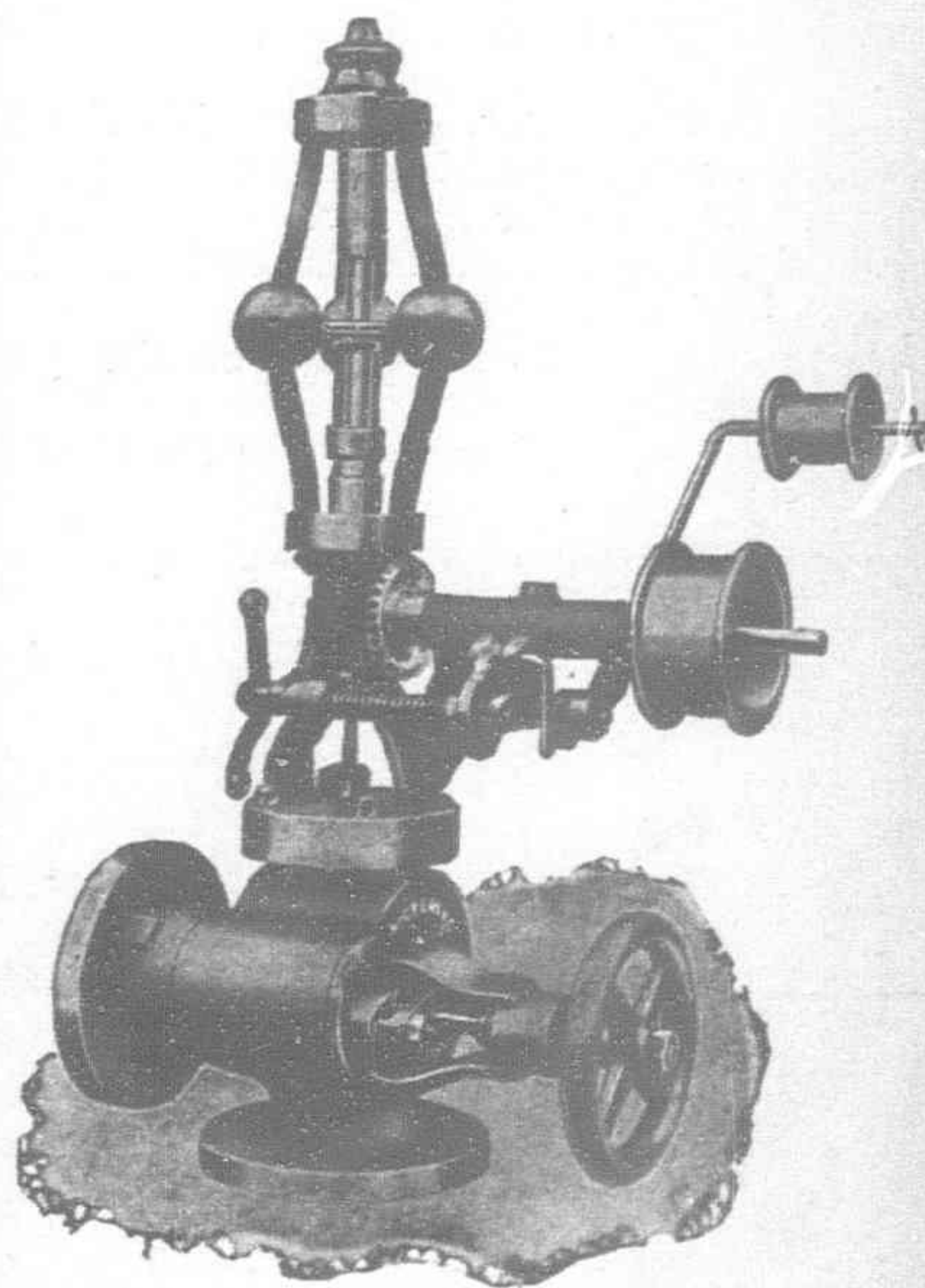
HIGHWAYS IN THE HAINAN ISLAND

—The total length of the 56 completed roads in the Hainan Island is 2,318 li, while that of the uncompleted ones, 868 li. The complete roads are distributed in the following districts: Wenhsien, 823 li.; Kiungshan, 552 li.; Tientsin, 340 li.; Lingkow 179 li.; Wanning 140 li.; Kintung 89 li.; Tengmai 85 li.; Tanhsien 60 li. and Lohwei 50 li. 1 li. = $\frac{1}{3}$ mile.

MOTOR HIGHWAY OFFICIALLY OPENED.

—The Inter-provincial motor highway connecting Lingpao, in Honan, with Tungkwang in Shensi, was formally opened to traffic today. Chairman Sung Chieh-yuan of the Kansu Provincial Government, Minister of Public Health Hsueh Tuh-pi, and representatives from General Feng Yu-hsiang and the Minister of Railways were among the officials present at the ceremony. A number of omnibuses are now operating on the new motor road.

PICKERING TYPE GOVERNORS



Makers.

Thomas Harrison, Ltd.

City Rd. & Preston St.,
Bradford.

Telep:
674,
Bradford.

ESTD. 1870

Telep:
"Governors"
Bradford

Distributing Agents:

Home

Export

Henry
Hollingsdrake
& Son, Ltd.,
Princes St, Stockport

Telep:
608, Stockport.
Telep:
"Hollingsdrake,
Stockport."

also London &
Southern Counties
The P.T. Engine
Governor Co.,
19, Bishopsgate,
London, E.C.2

Telep:
2802, London Wall
Telep:
"Acquedotto, Stock,
London"